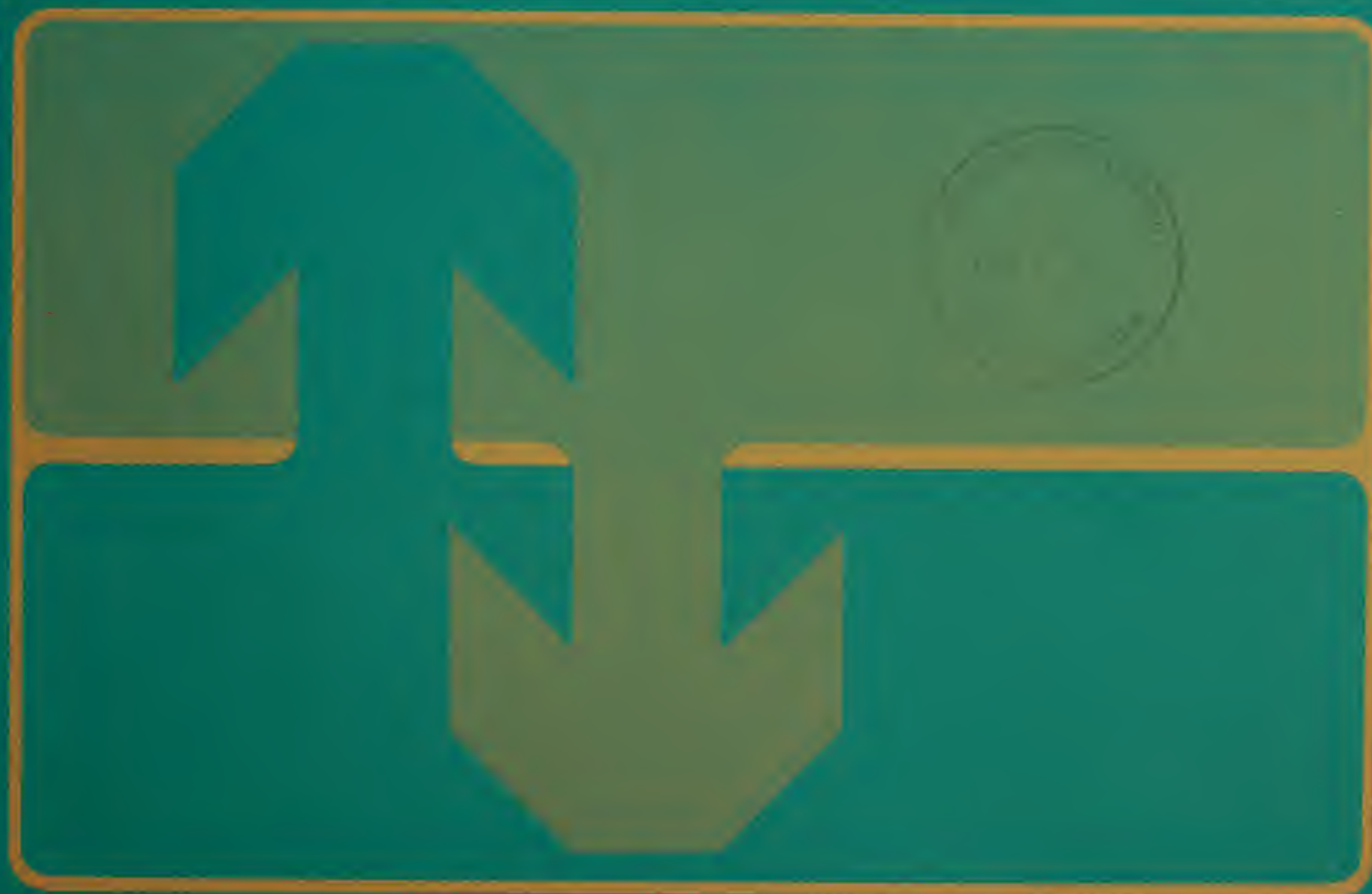


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BOMEX

Period III Atlas of Low-Level Atmospheric Data

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U. S. DEPARTMENT
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National Oceanic and
Atmospheric Administration

Environmental Data Service



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BOMEX

Period III Atlas of Low-Level Atmospheric Data

Center for Experiment Design and Data Analysis

Washington, D. C.
June 1975

ACKNOWLEDGMENTS

This atlas was prepared under the direction of James A. Almazan, CEDDA. The computer plots were produced by Mel Craddock at the National Climatic Center.

INTRODUCTION

During the Barbados Oceanographic and Meteorological Experiment (BOMEX), conducted in the summer of 1969, data were gathered by aircraft, ships, and buoys, supplemented by satellite data and observations made on the island of Barbados. Details of the experiment are given in *BOMEX Field Observations and Basic Data Inventory* issued in 1971 by the BOMAP Office (now Center for Experiment Design and Data Analysis), and the scientific objectives of BOMEX have been described by J. P. Kuettner and J. Holland ("The BOMEX Project," *Bulletin of the American Meteorological Society*, Vol. 50, No. 6, 1969, pp. 394-402).

The vast amount of data collected, after processing and validation by the Center for Experiment Design and Data Analysis of NOAA's Environmental Data Service, has been placed in the BOMEX Permanent Archive at the National Climatic Center, Asheville, N.C. Among these data are surface measurements obtained with sensors mounted on a boom extending from the bow of each of the five BOMEX ships approximately 10 m above the sea surface, and observations made with the specially designed Boundary Layer Instrument Package (BLIP), which was launched from four of the ships.

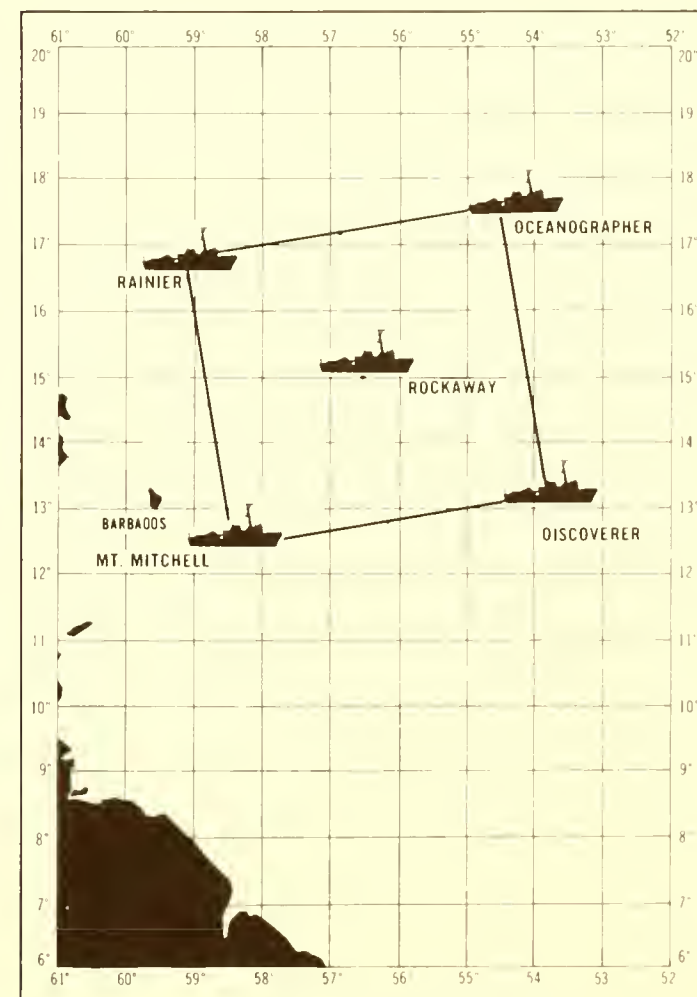
Presented in this atlas are day-to-day time series displays of the boom and BLIP data for BOMEX Period III, June 19 to July 2, 1969, when the five ships occupied positions at the corners and in the center of the BOMEX square array as shown in the accompanying figure. Included also are ship operation mode and synoptic data based on standard meteorological observations. Blanks indicate that data were missing or deleted in editing, or that the number of samples was not sufficient to derive average values. The last applies to the BLIP data for the *Rainier*, and BLIP data are also missing for the *Rockaway*, which did not carry the special instrument package.

SURFACE DATA

The boom surface data presented here were obtained by all five ships, the *Discoverer*, *Mt. Mitchell*, *Oceanographer*, *Rainier*, and *Rockaway*. They consist of 10-min averages derived from the original 30-s samples of dry-bulb temperature, sea-surface temperature, windspeed, and specific humidity computed from the vapor pressure obtained via Teten's equation

(*Handbook of Meteorology*, McGraw-Hill Book Co., N.Y., 1945, p. 343.) Wind direction is shown as hourly averages. The manually recorded synoptic data are plotted in the standard World Meteorological Organization code, and show the total amount of cloud cover, type of clouds and their amounts, and present and past weather. A straight line at the bottom of each display shows periods when the ship was operating in a drifting mode; a blank indicates that the ship was steaming to maintain station. This information is included because the wind values are not corrected for ship motion.

The 10-min averages, which are now available from the BOMEX Permanent Archive, were derived via a second-order least-squares method. No further editing was done for purposes of this atlas, and these values were also used in forming the hourly averages of wind



BOMEX ship array, Period III.

direction. For a detailed description of the editing procedures, the reader is referred to the documentation that accompanies the archived data.

BLIP DATA

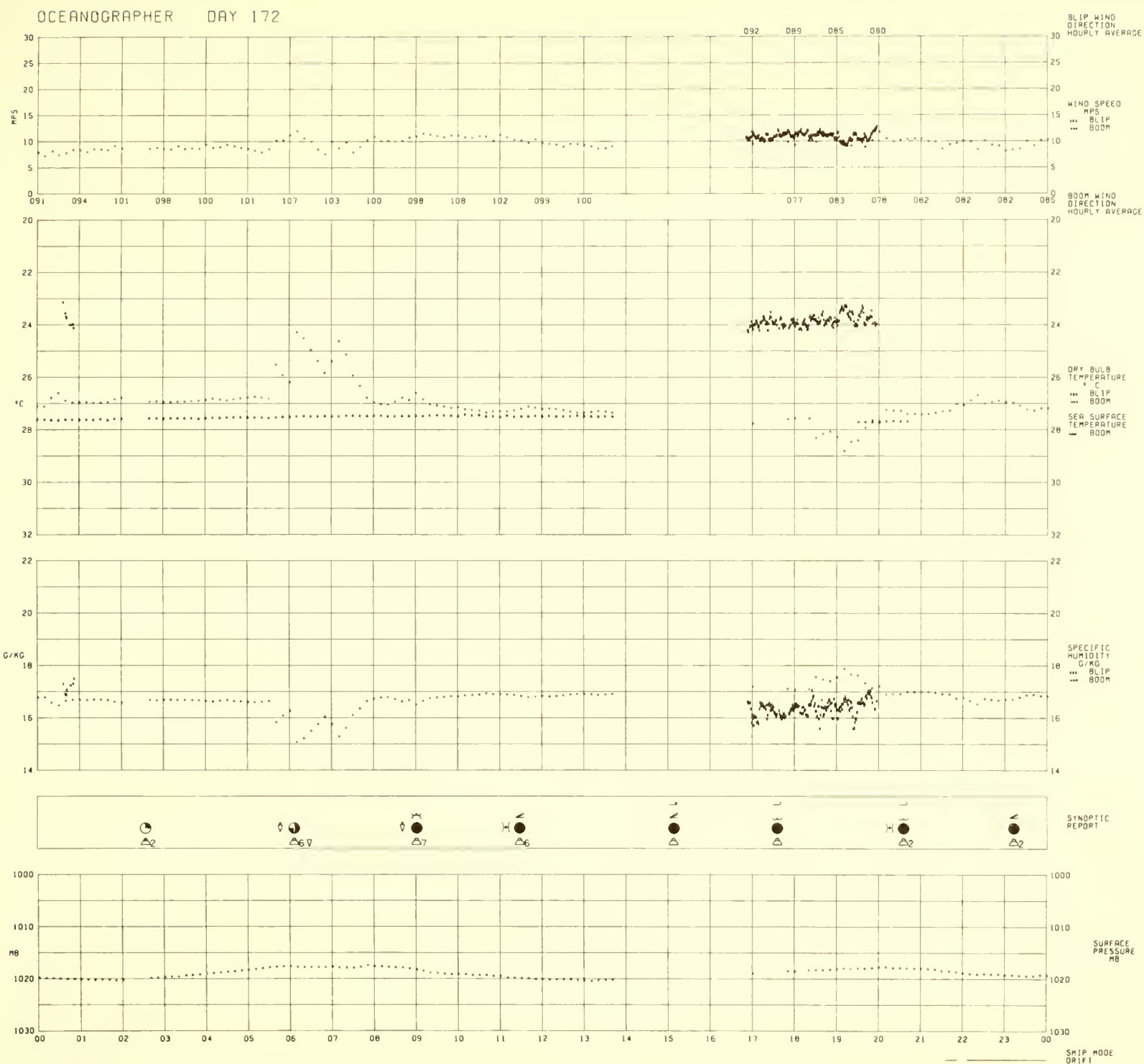
The Boundary Layer Instrument Package was essentially a multichannel radiosonde launched by means of a tethered balloon from the afterdeck of each of the four corner ships. The balloon was generally lifted to a height of 300 m, left at that level for several hours, and then retrieved. Dry- and wet-bulb temperatures, windspeed, wind direction, relative humidity, and pressure were measured at a rate of three samples per second (sps). The pressure sensor was a modified radiosonde baroswitch that provided only six or seven discrete readings from the surface to 300 m. The windspeed was directly proportional to the frequency of rotation of a three-cup anemometer. The wind direction was obtained by special instrumentation that measured the angle of the package, which was always pointed into the wind, from magnetic north. A detailed description of the measuring system has been given by J. A. Almazan ("The BOMEX Boundary Layer Instrument Package," *Preprints, Second Symposium on Meteorological Observations and Instrumentation, March 27-30, 1972*, American Meteorological Society, 1972, pp. 138-144).

Before archiving, the 3-sps BLIP data were edited by means of data "windows," the data were reduced to 1-sps format, and the quality of the data was noted for

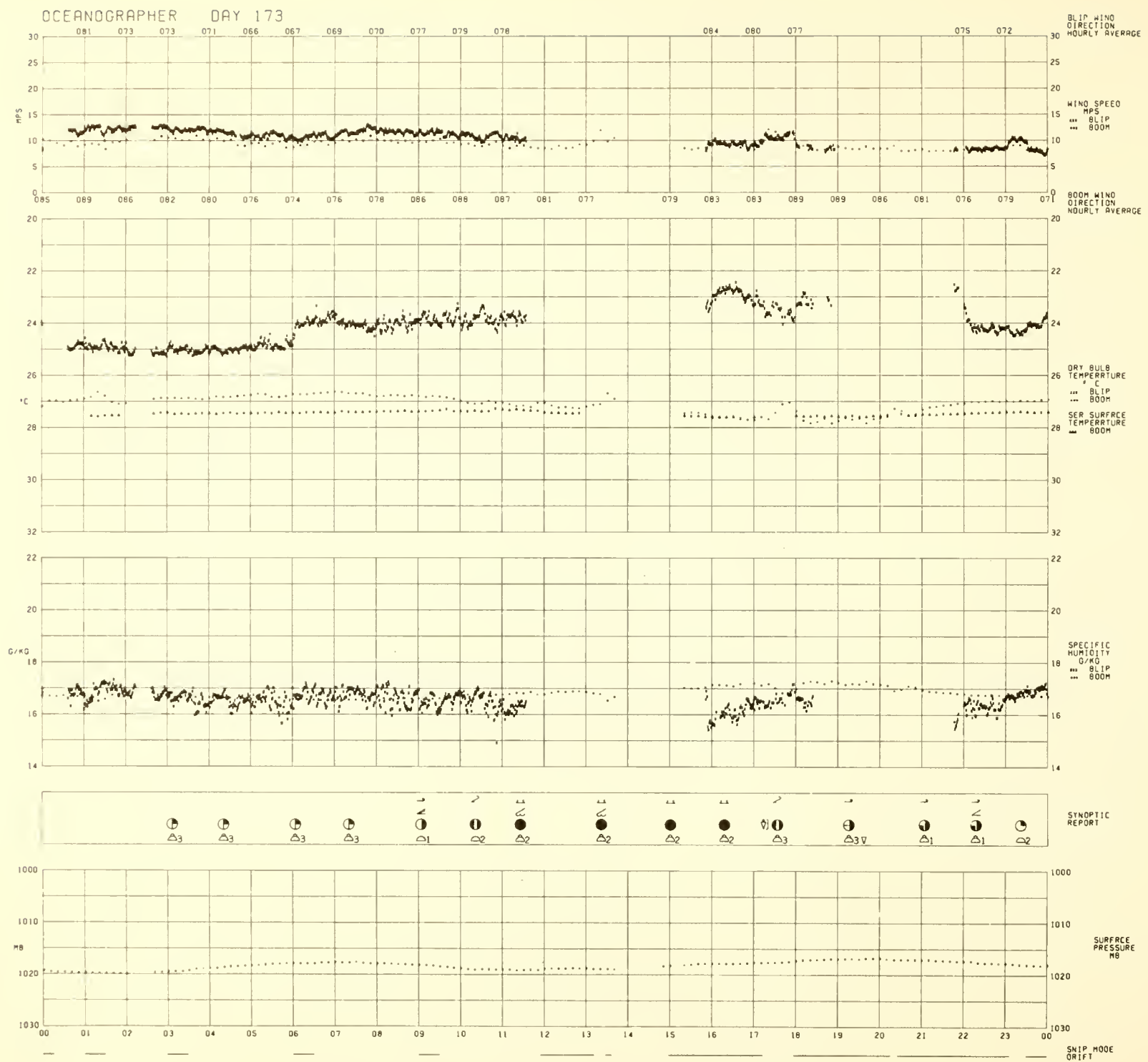
each sample. The 1-min averages of dry-bulb temperature, specific humidity, and windspeed, as well as the hourly averages of wind direction, presented in this atlas were derived from the 1-sps archived data, which were further edited by rejection of values based on the criterion of one standard deviation.

In computing the specific humidity, the vapor pressure was first obtained from the dry- and wet-bulb temperature differences via the Goff-Gratch equation (*Smithsonian Tables*, 1951, p. 350), and the specific humidity was then derived from $q = 6.22e / (p - 0.378e)$, where q is the specific humidity, p is the pressure, and e is the vapor pressure. The mean pressure value at 300 m during BOMEX Period III was 980 mb, and this is the value used in the calculation. It is approximate, since the baroswitch gave only gross measurements of the pressure, and there was no direct measurement of the height.

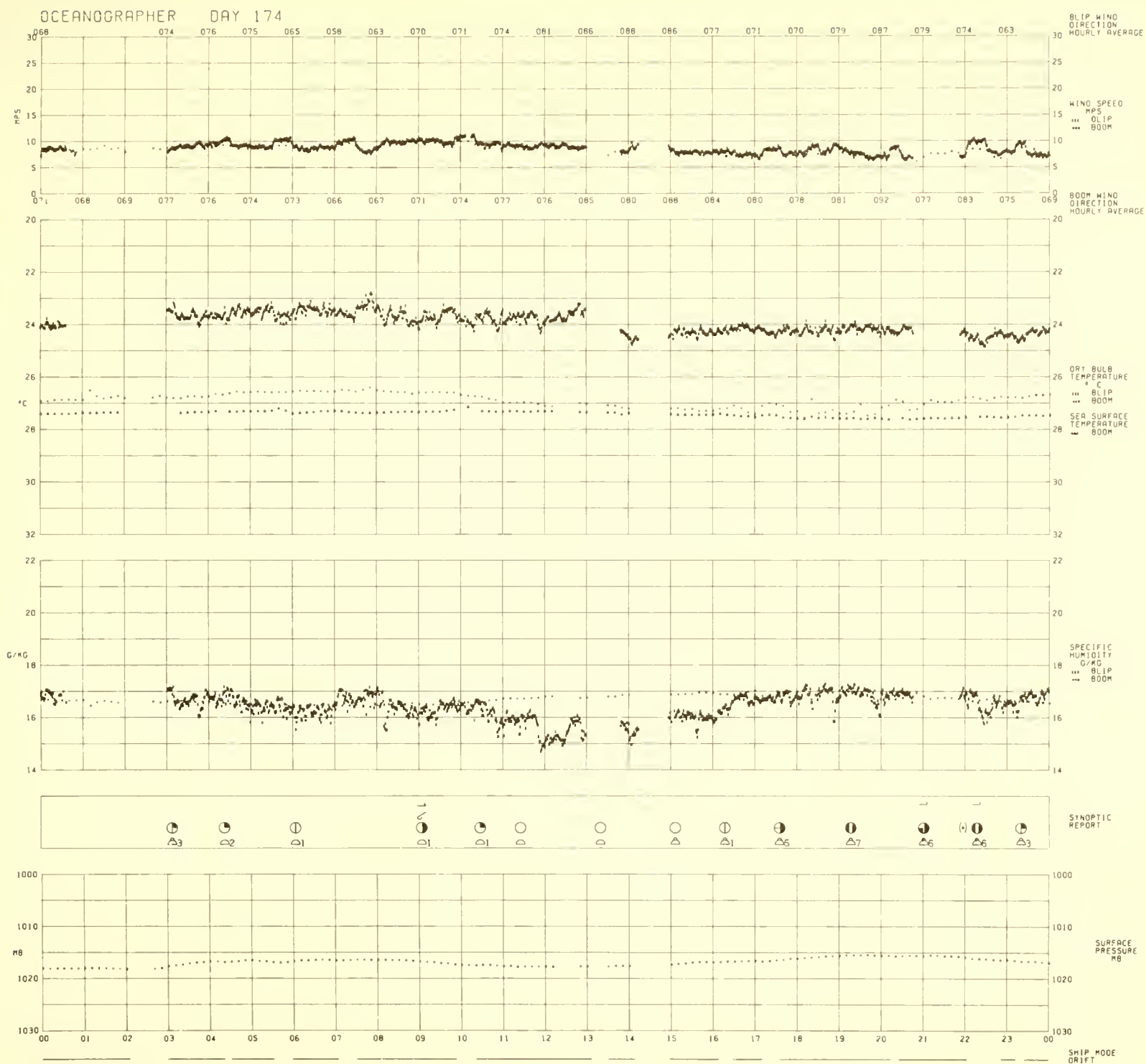
A primary purpose in presenting the BLIP data in this atlas is to give a first estimate of the character, quality, and length of these unique time series, which lend themselves to spectral analysis, and to display the effects of varying synoptic conditions on temperature, humidity, and wind at the surface and at 300 m. The data obtained during instrument ascent and descent are not included here. The archived data, however, provide an opportunity for constructing profiles for various synoptic conditions, as has been done in selected cases by C. F. Ropelewski of the Center for Experiment Design and Data Analysis in *NOAA Technical Memorandum EDS BOMAP-12*, "Profiles in the Lowest 300 Meters of the Marine Tropical Boundary Layer."



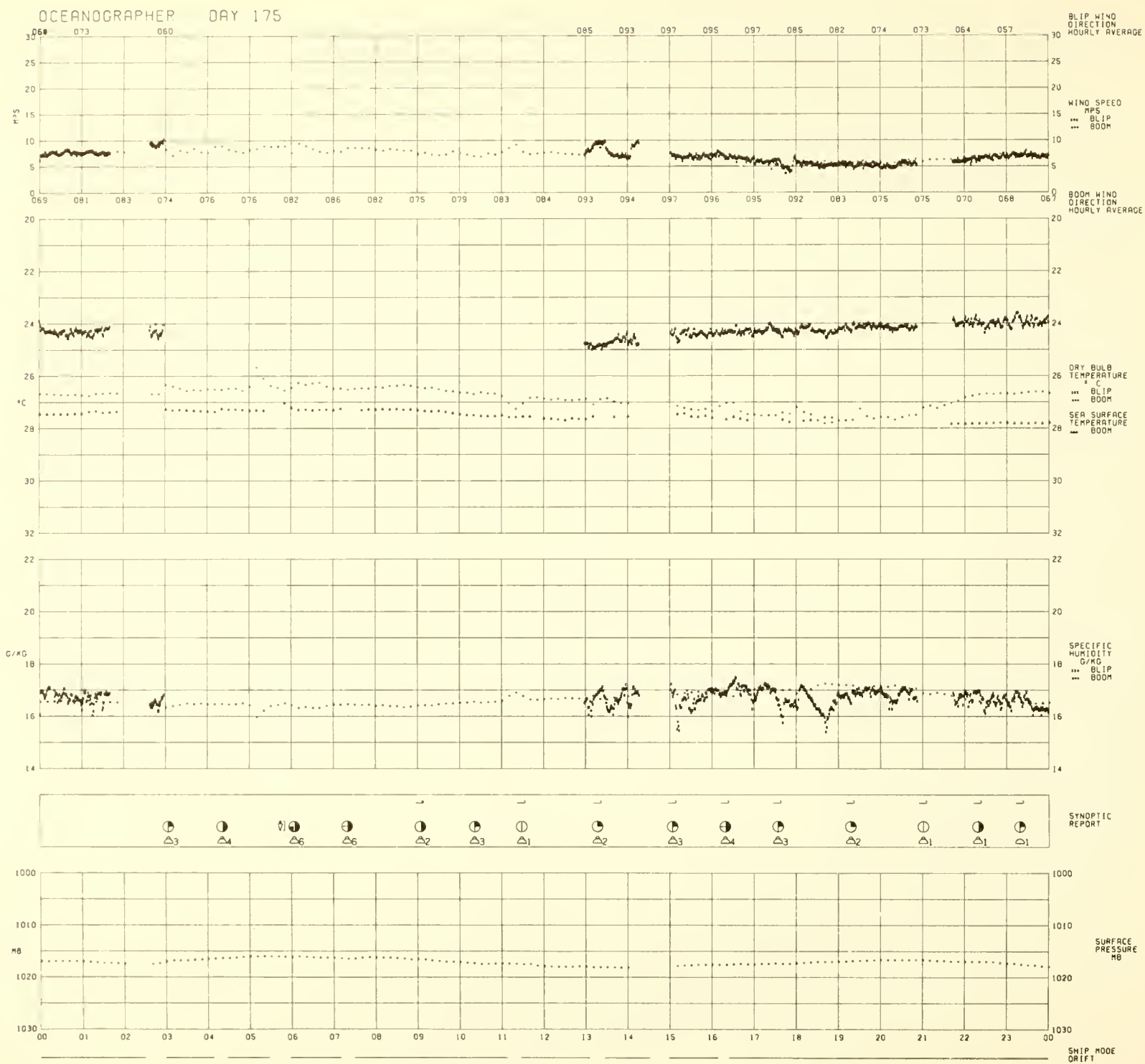
Oceanographer, June 21, 1969



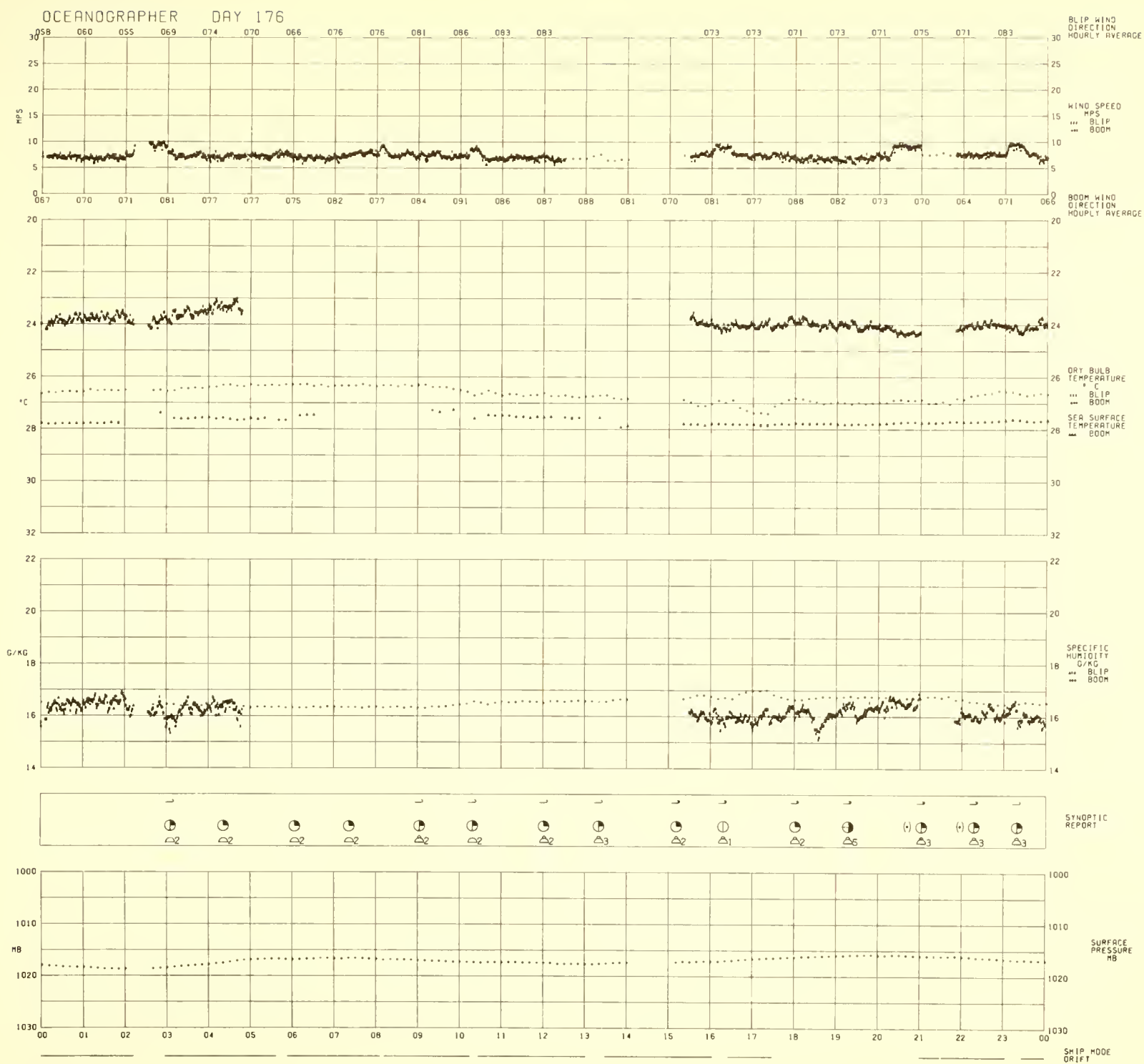
Oceanographer, June 22, 1969



Oceanographer, June 23, 1969



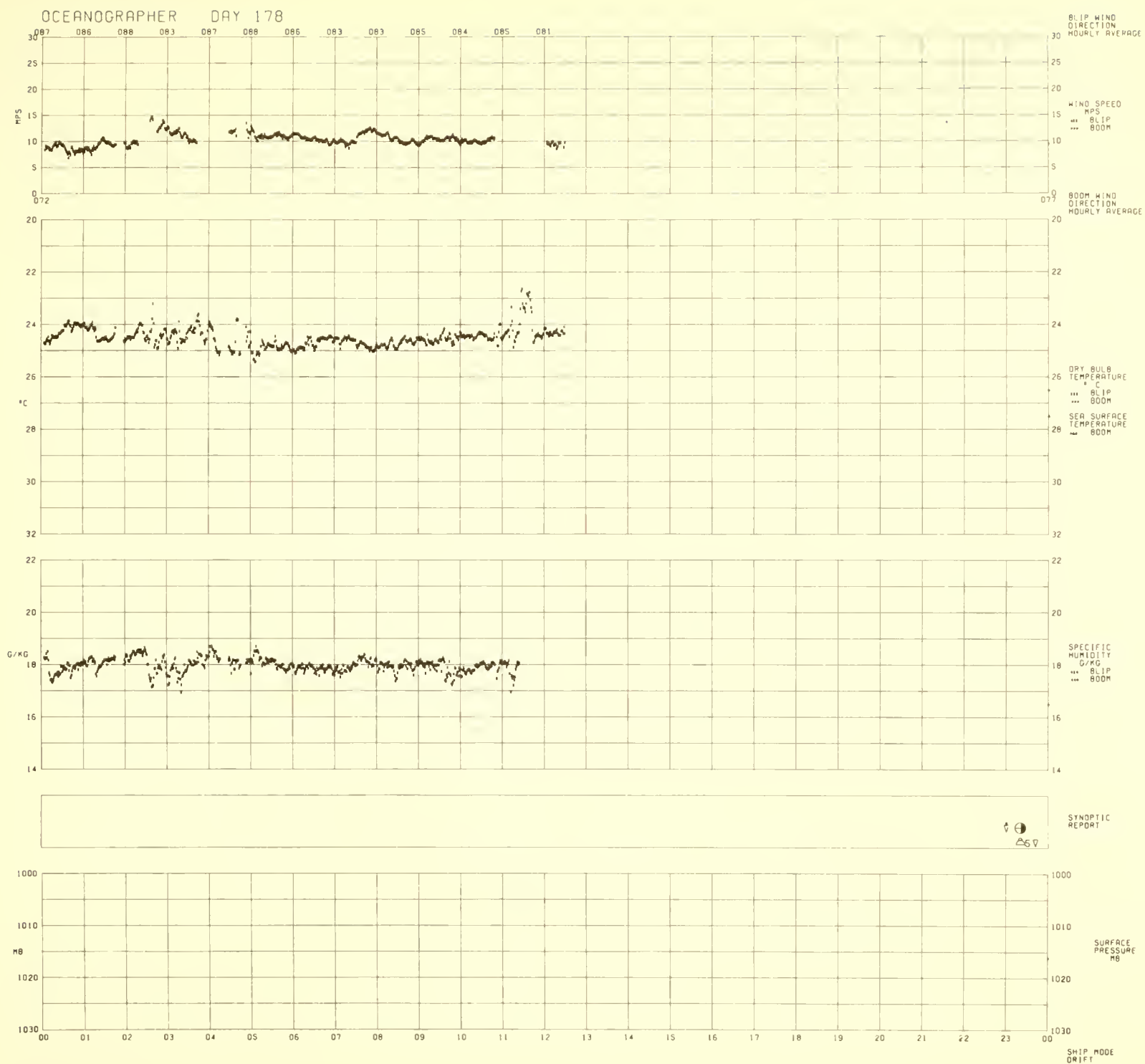
Oceanographer, June 24, 1969



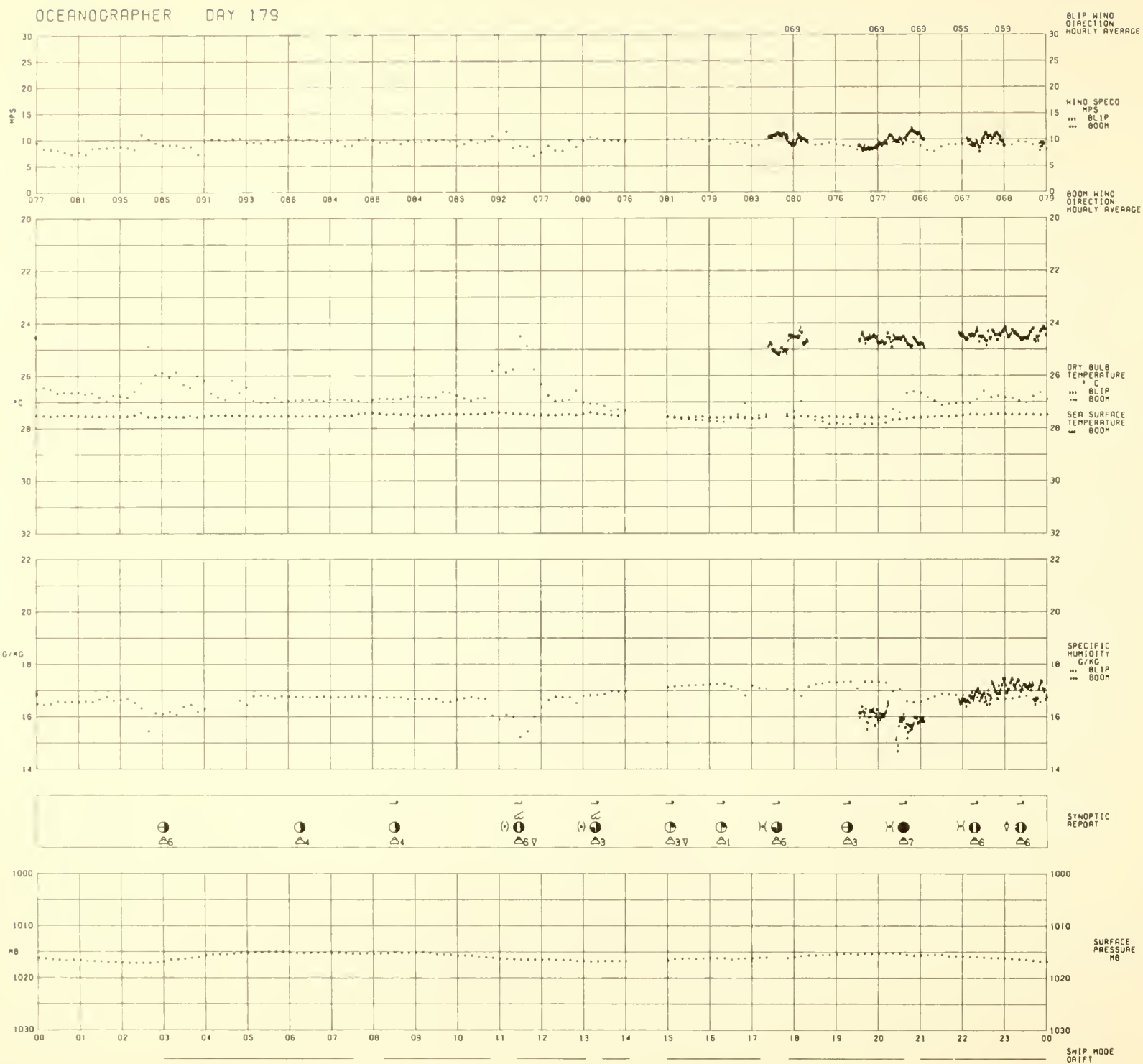
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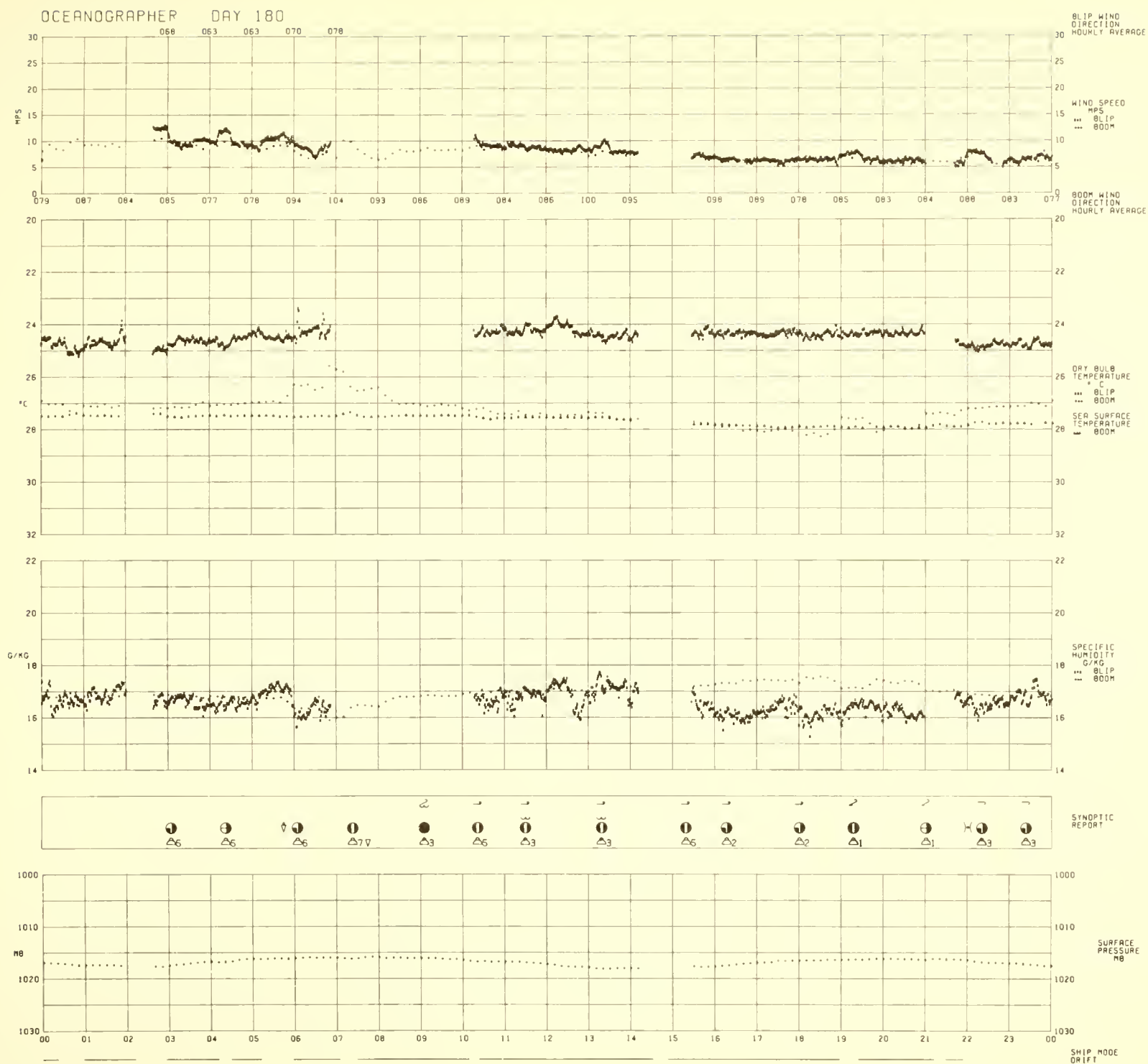
Oceanographer, June 26, 1969



Oceanographer, June 27, 1967

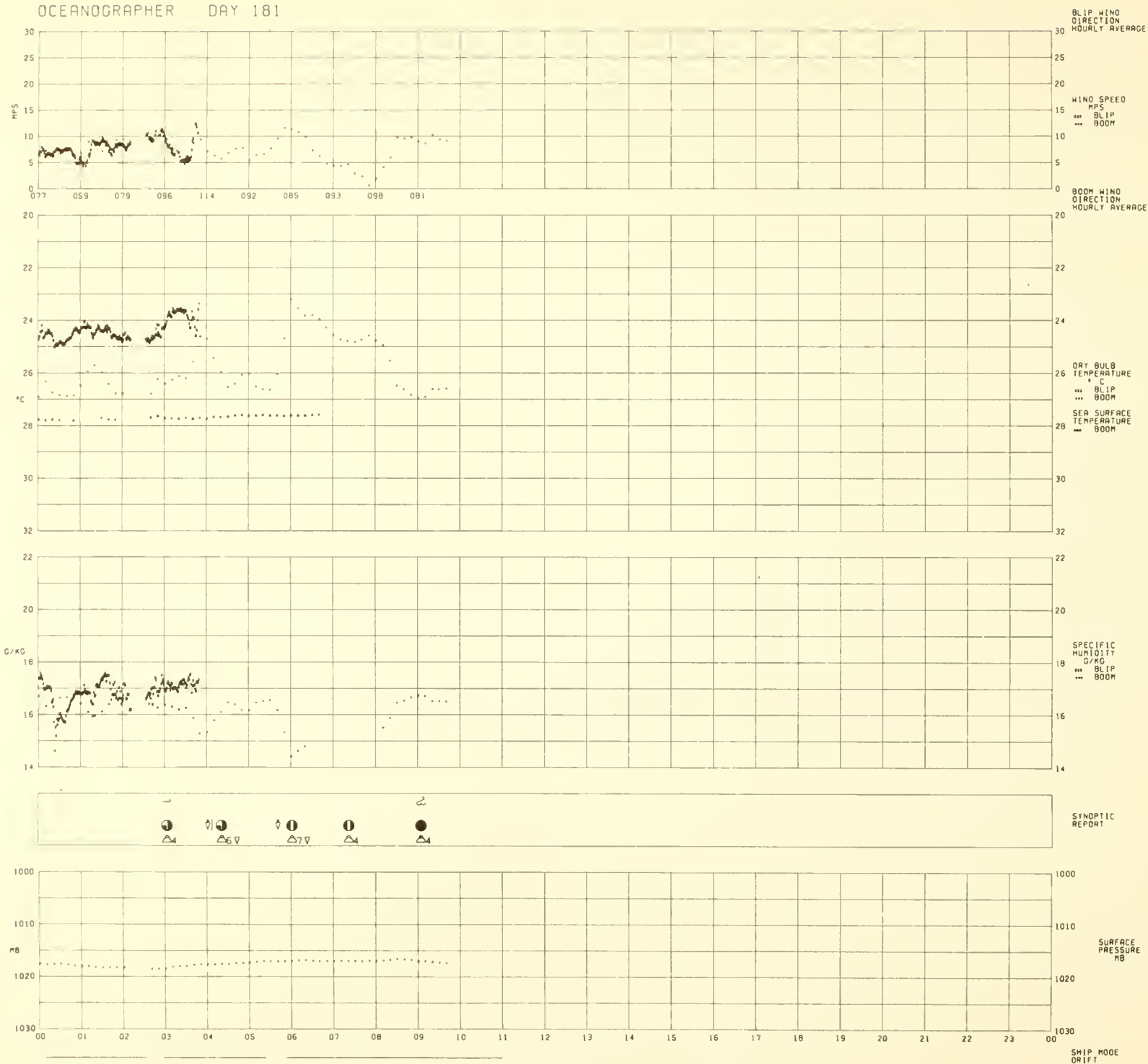


Oceanographer, June 28, 1969



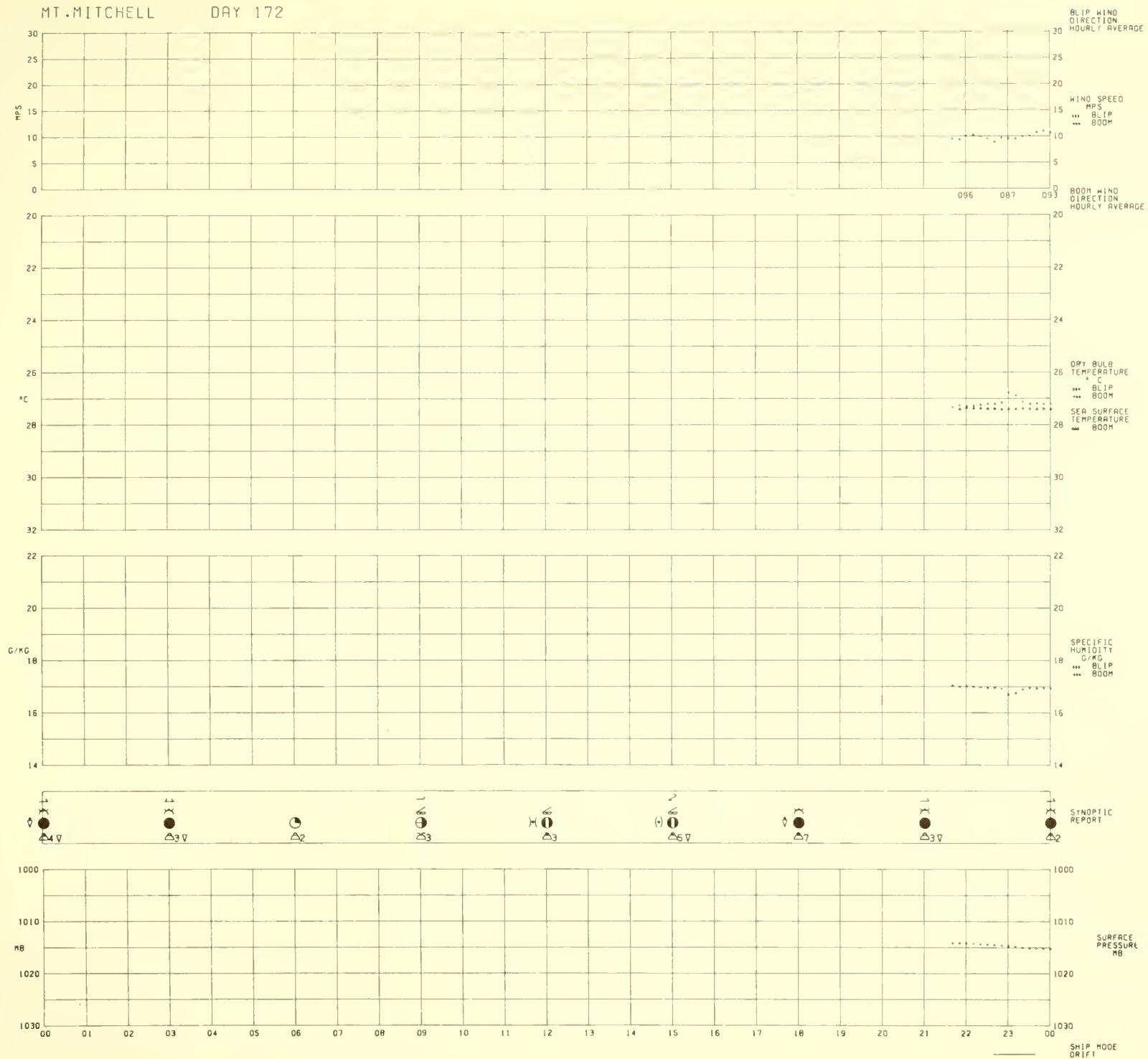
Oceanographer, June 29, 1969

OCEANOGRAPHER DAY 181



Oceanographer, June 30, 1969

MT. MITCHELL DAY 172



Mt. Mitchell, June 21, 1969

MT. MITCHELL DAY 173

WIND SPEED
MPS
BLIP
BOOM

WIND DIRECTION
HOURLY AVERAGE

DRY BULB
TEMPERATURE
°C
BLIP
BOOM

SEA SURFACE
TEMPERATURE
°C
BLIP
BOOM

SPECIFIC
HUMIDITY
G/KG
BLIP
BOOM

SYNOPTIC
REPORT

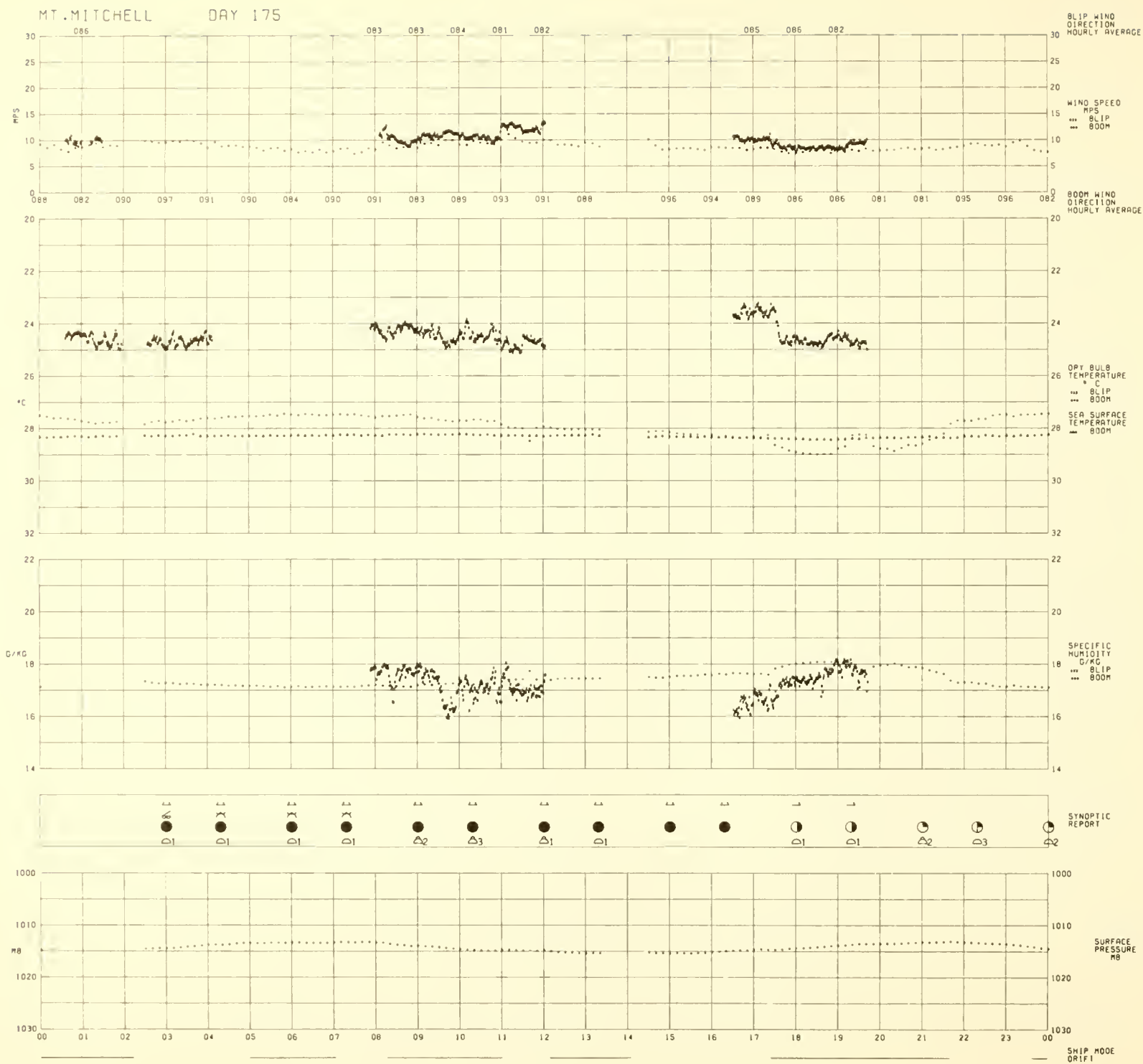
SURFACE
PRESSURE
MB

SHIP MODE
ORIFT

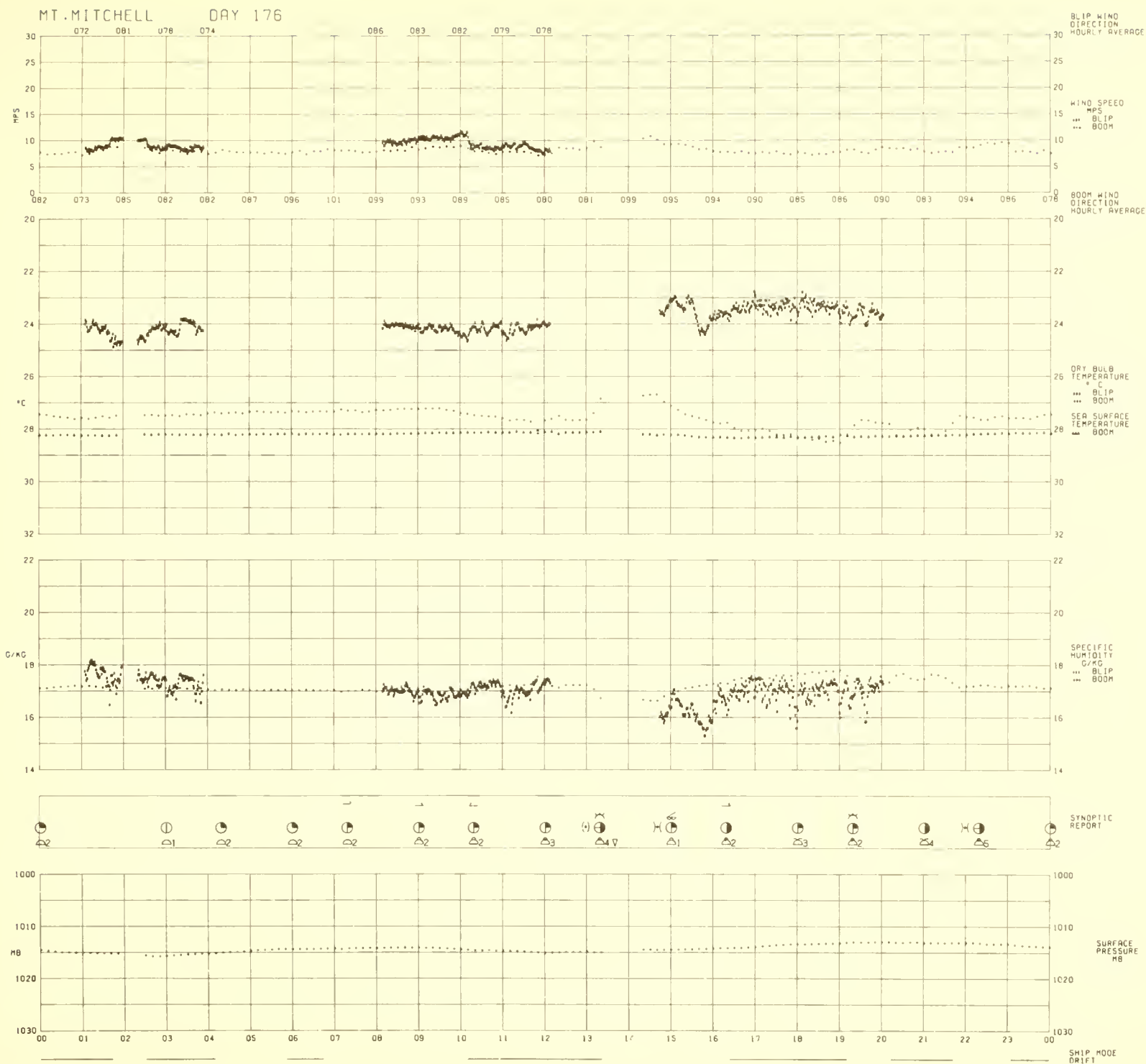
14



Mt. Mitchell, June 23, 1969



Mt. Mitchell, June 24, 1969



Mt. Mitchell, June 25, 1969

MT. MITCHELL DAY 177

WIND SPEED
m/s
BLIP
800M

DRY BULB
TEMPERATURE
°C
BLIP
800M

SEA SURFACE
TEMPERATURE
°C
BLIP
800M

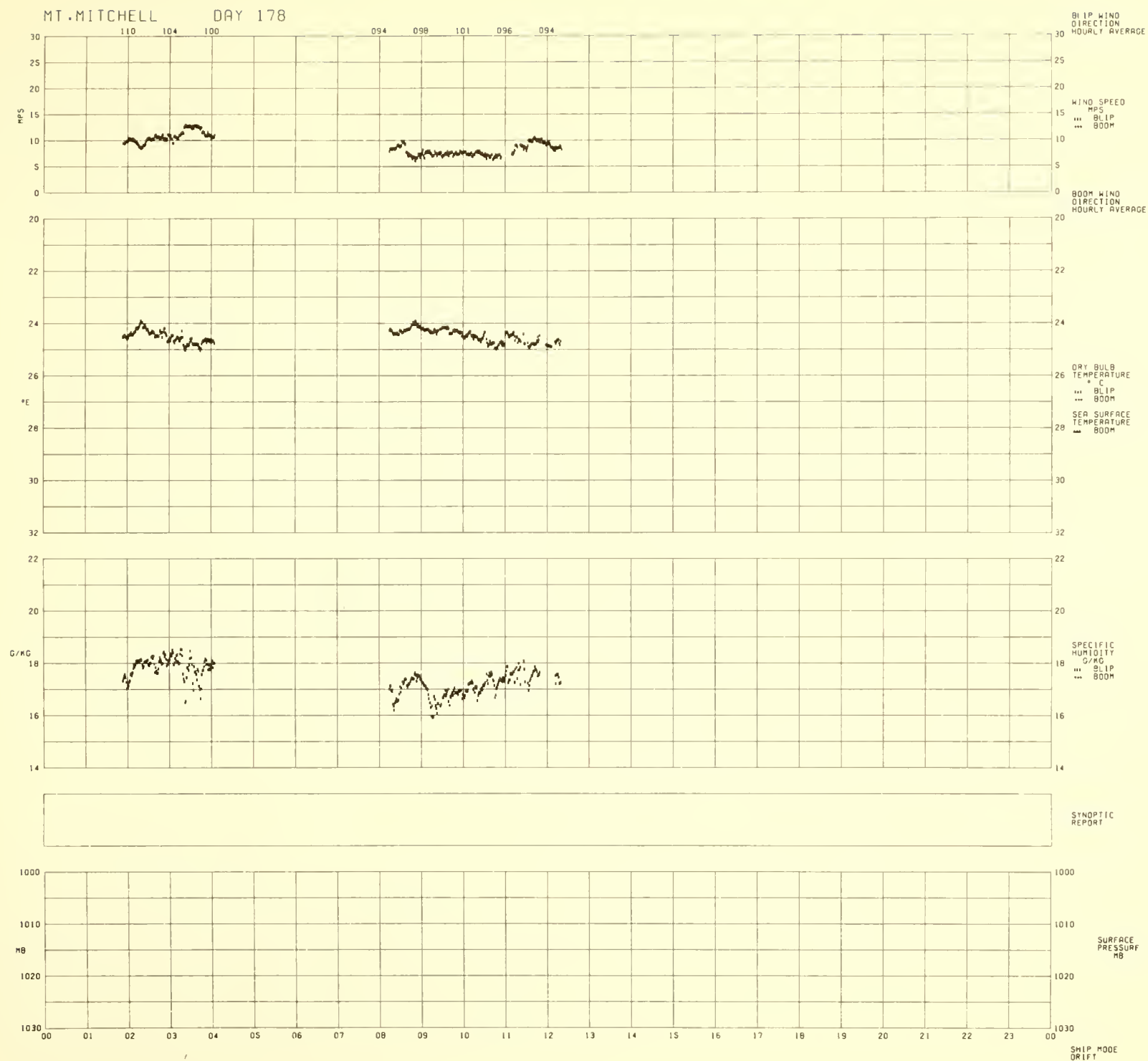
SPECIFIC
HUMIDITY
g/kg
BLIP
800M

SYNOPTIC
REPORT

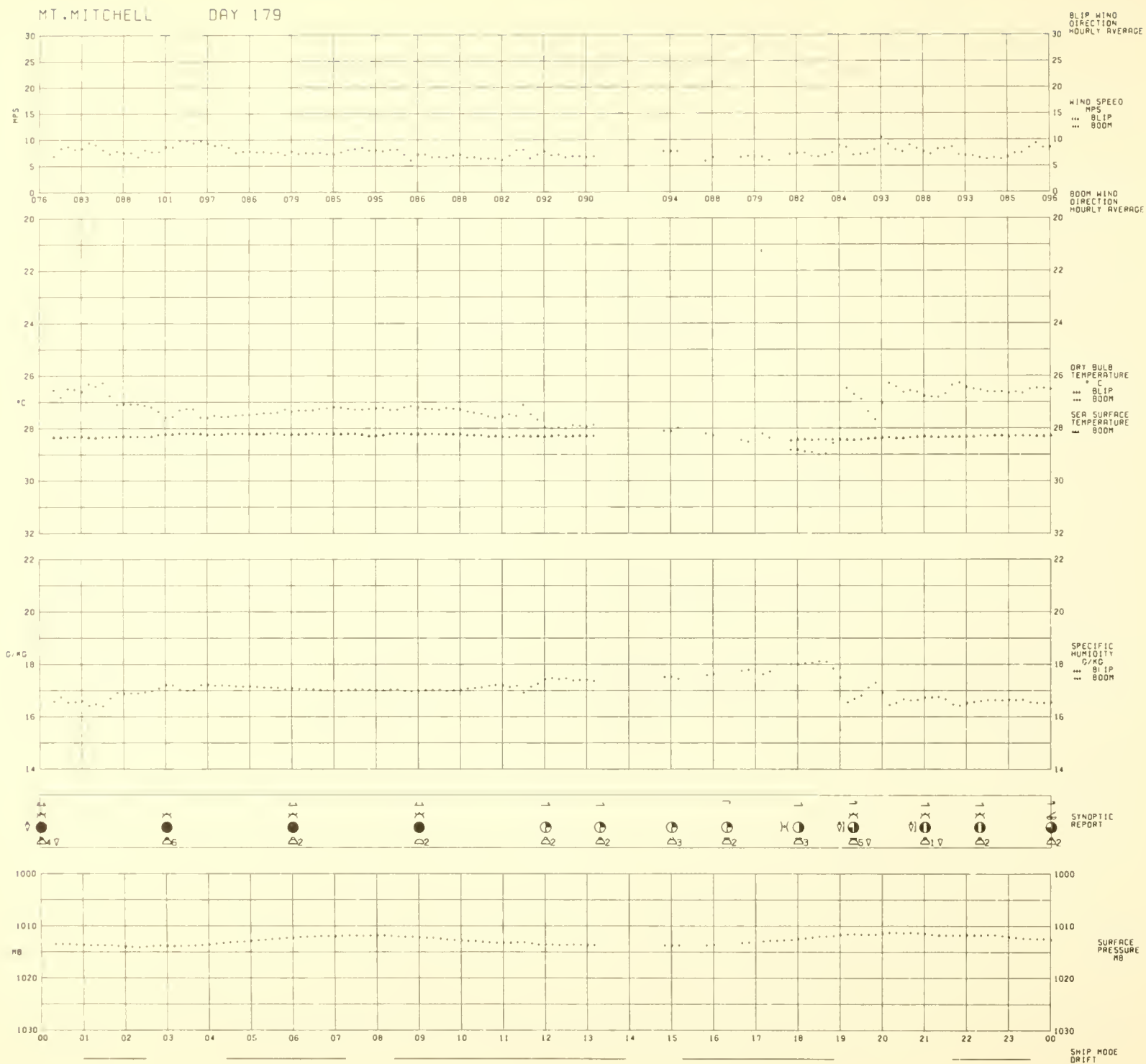
SURFACE
PRESSURE
mb

SHIP MODE
DRIFT

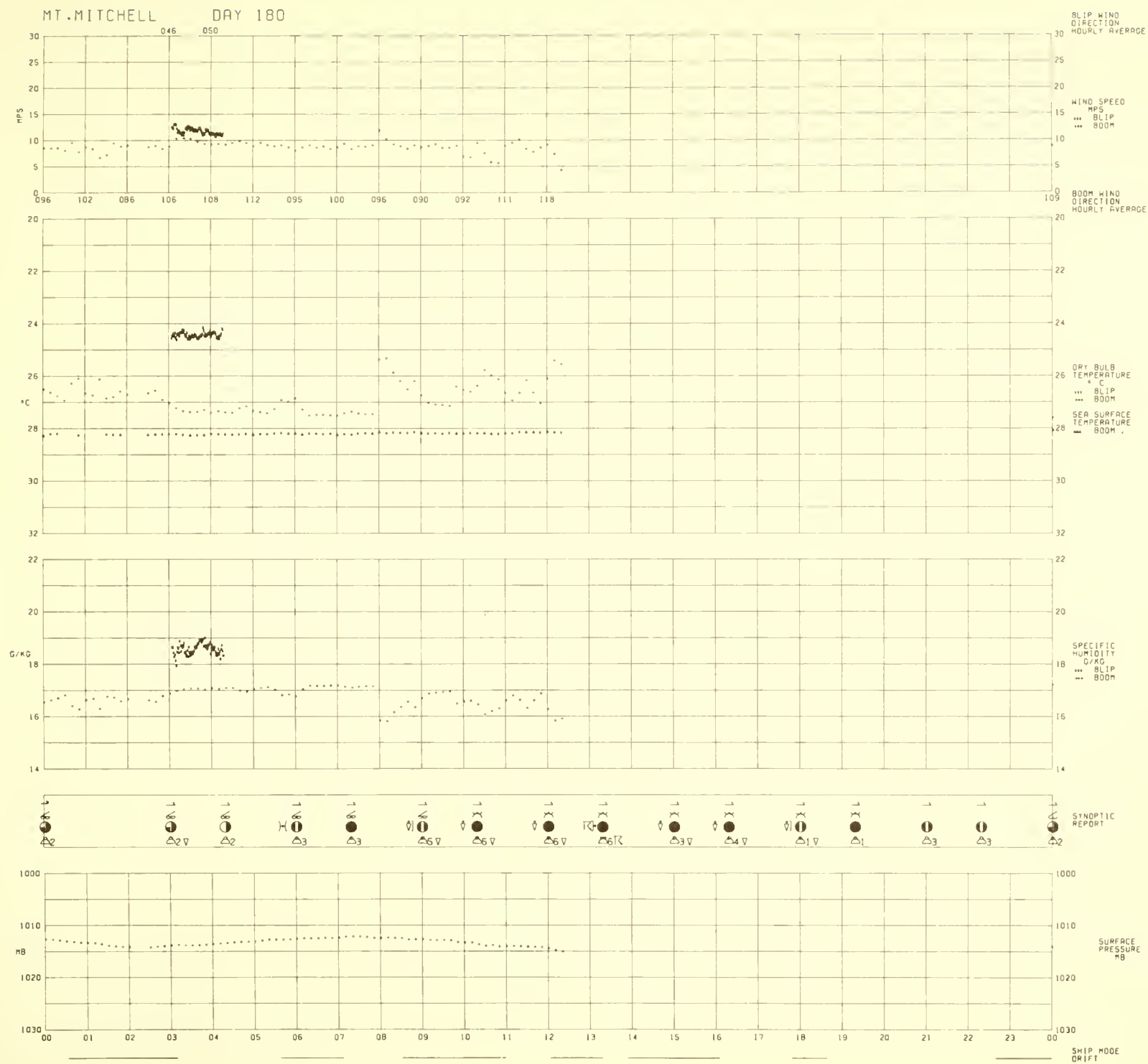
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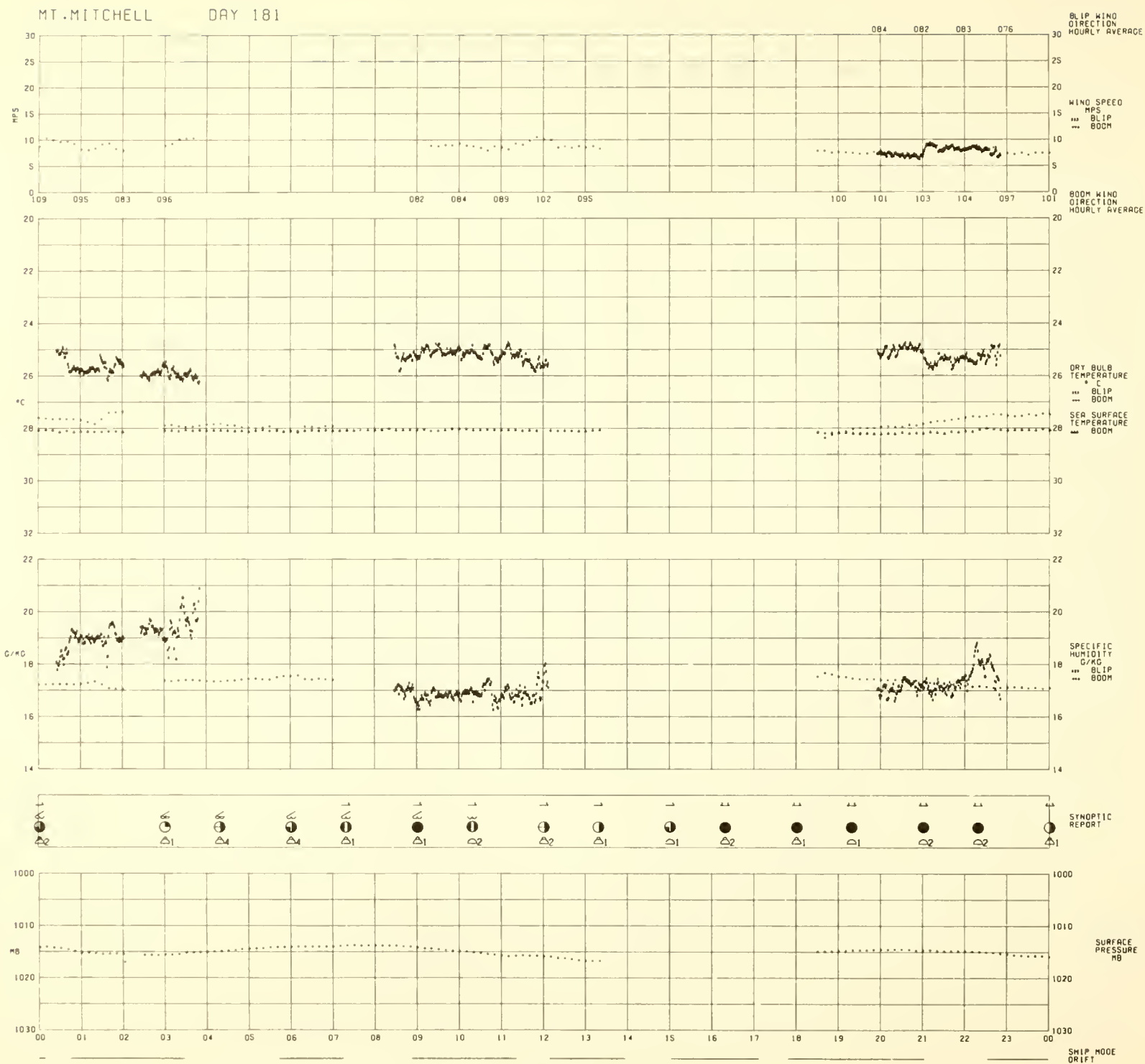
Mt. Mitchell, June 27, 1969



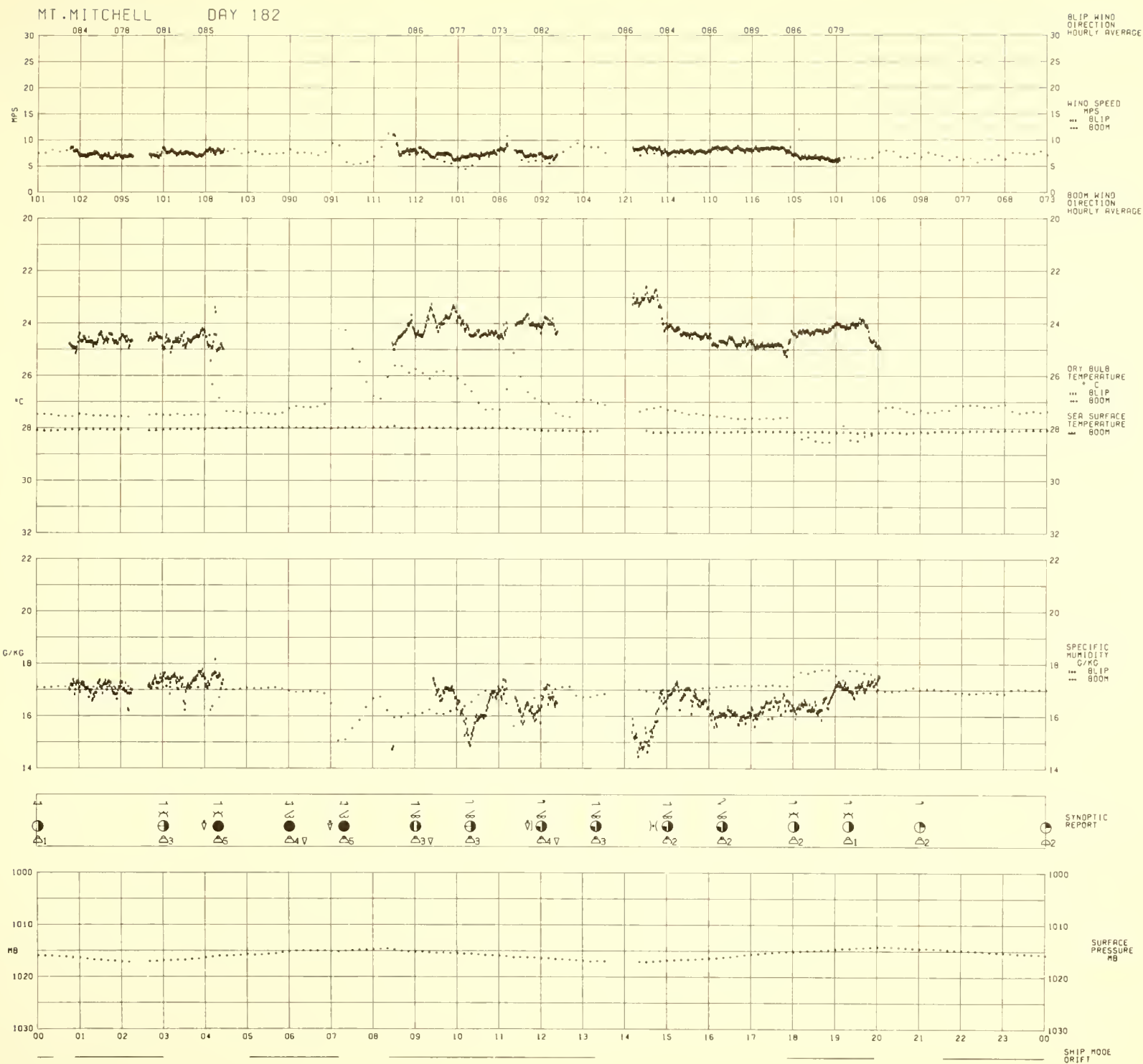
Mt. Mitchell, June 28, 1969



Mt. Mitchell, June 29, 1969



Mt. Mitchell, June 30, 1969



Mt. Mitchell, July 1, 1969

MT. MITCHELL DAY 183

060 063 066 067 068 069 065

WIND SPEED
MPS
BLIP
800M

BLIP WIND DIRECTION HOURLY AVERAGE

800M WIND DIRECTION HOURLY AVERAGE

DRY BULB TEMPERATURE °C
BLIP
800M

SEA SURFACE TEMPERATURE °C
BLIP
800M

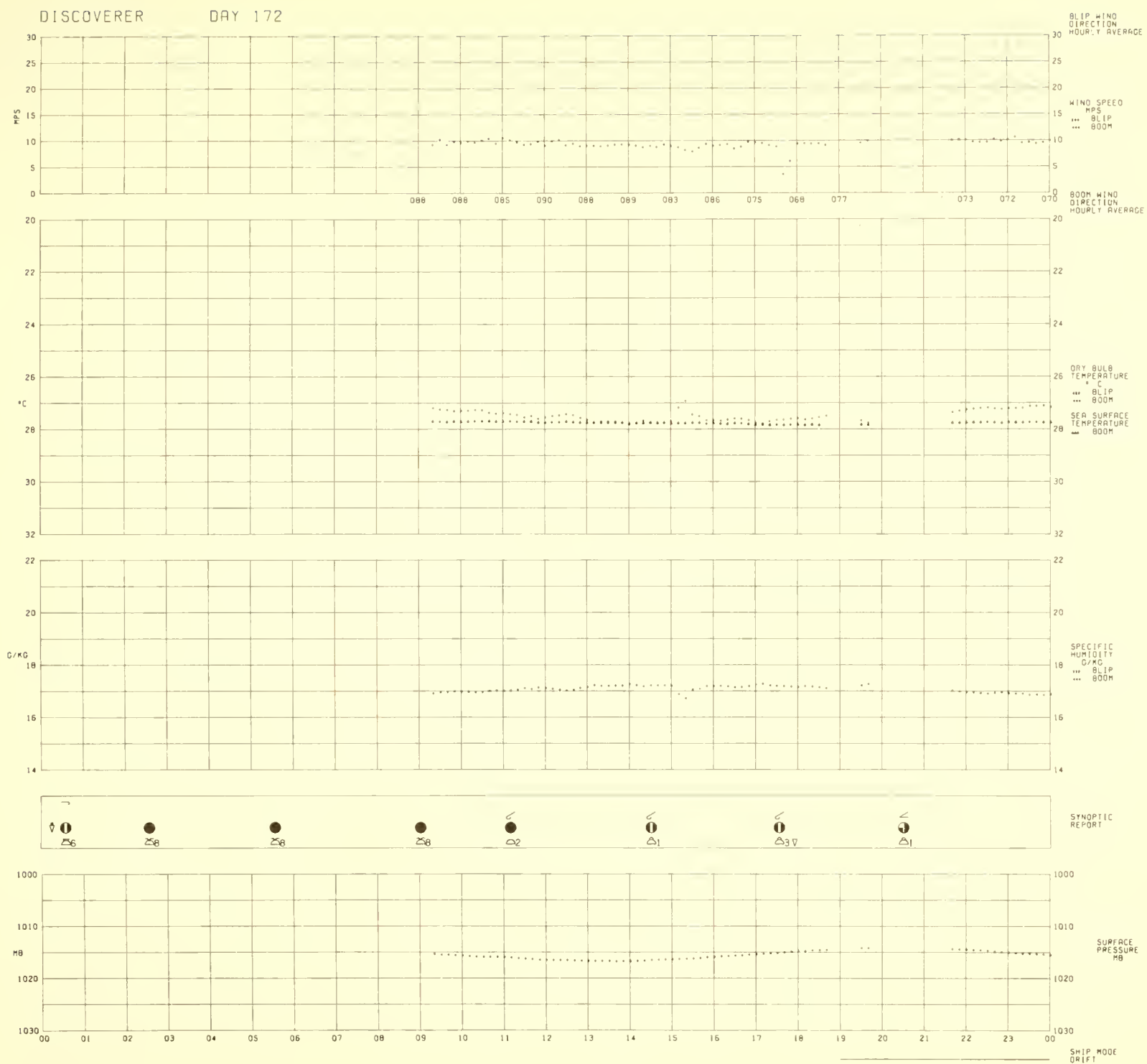
SPECIFIC HUMIDITY g/kg
BLIP
800M

SYNOPTIC REPORT

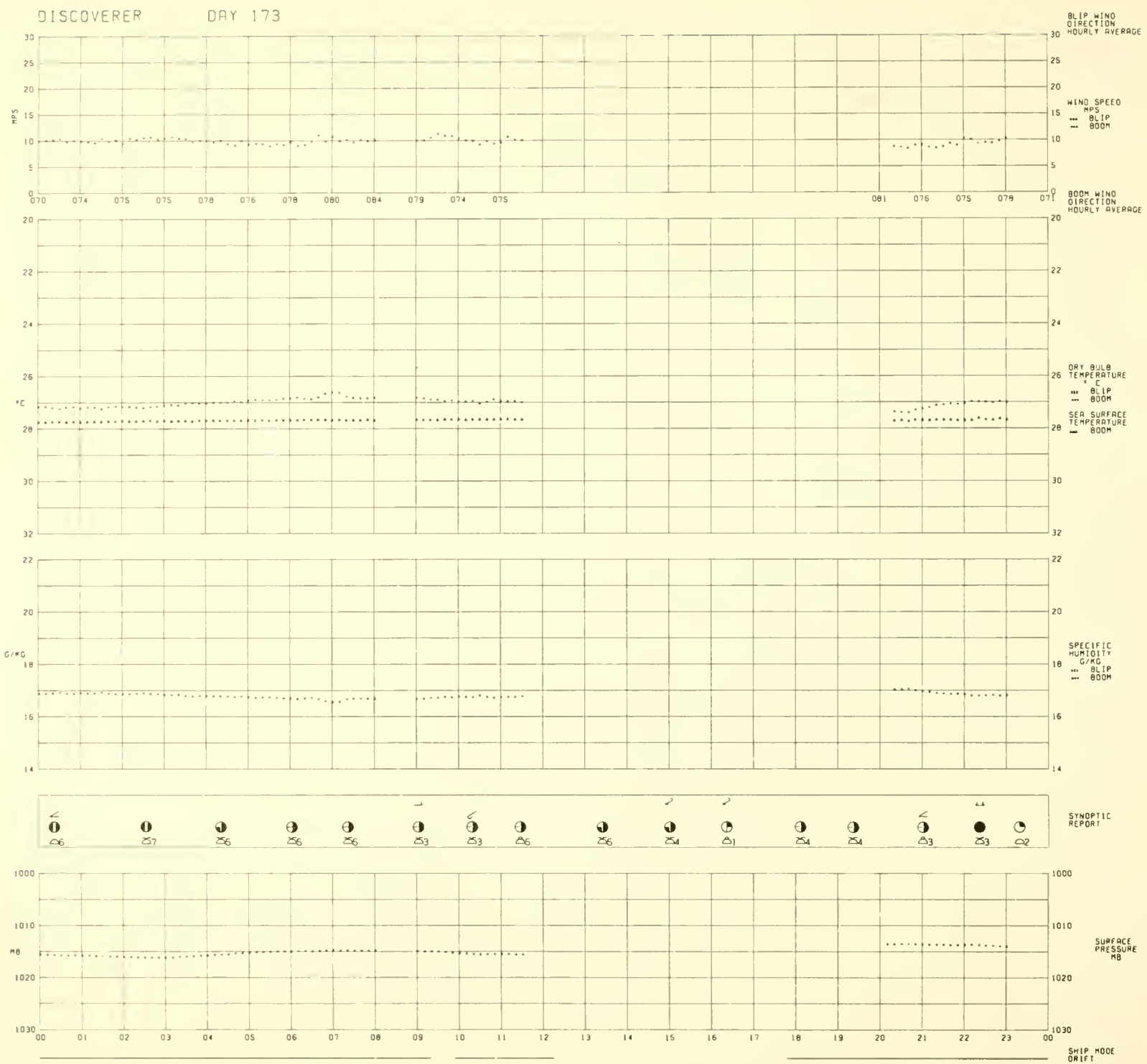
SURFACE PRESSURE hPa

SHIP MODE ORIFT

Mt. Mitchell, July 2, 1969

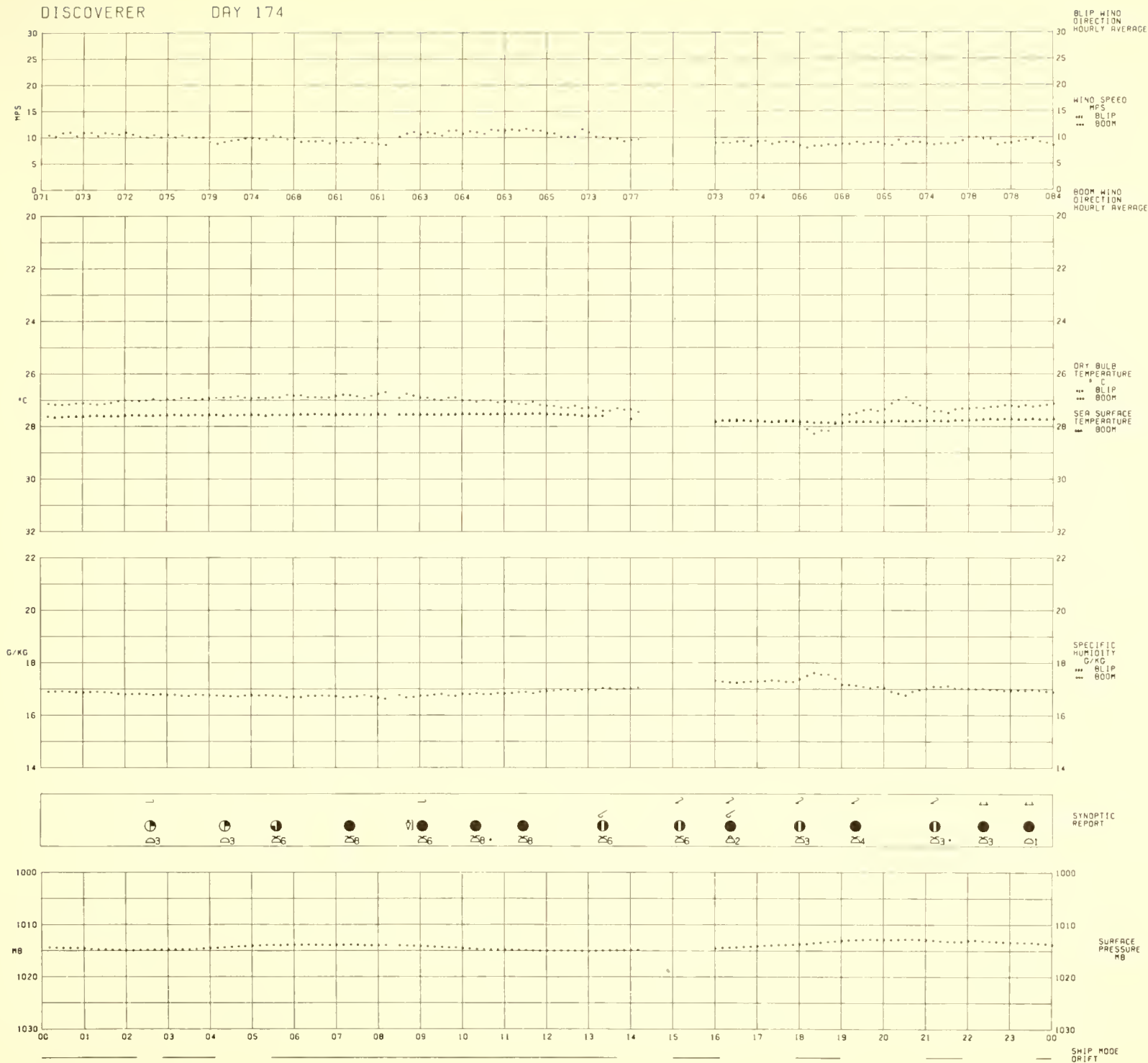


Discoverer, June 21, 1969

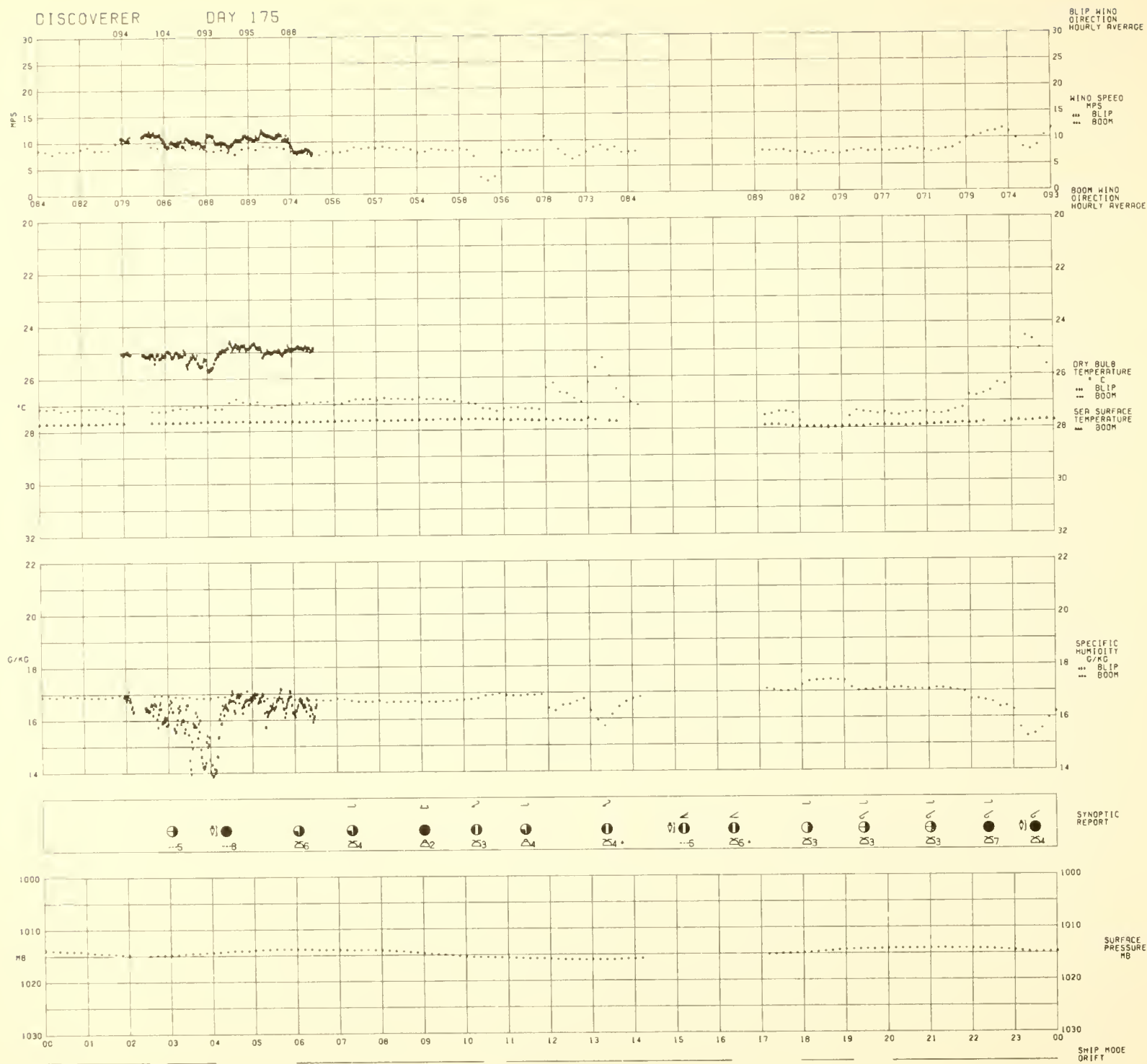


Discoverer, June 22, 1969

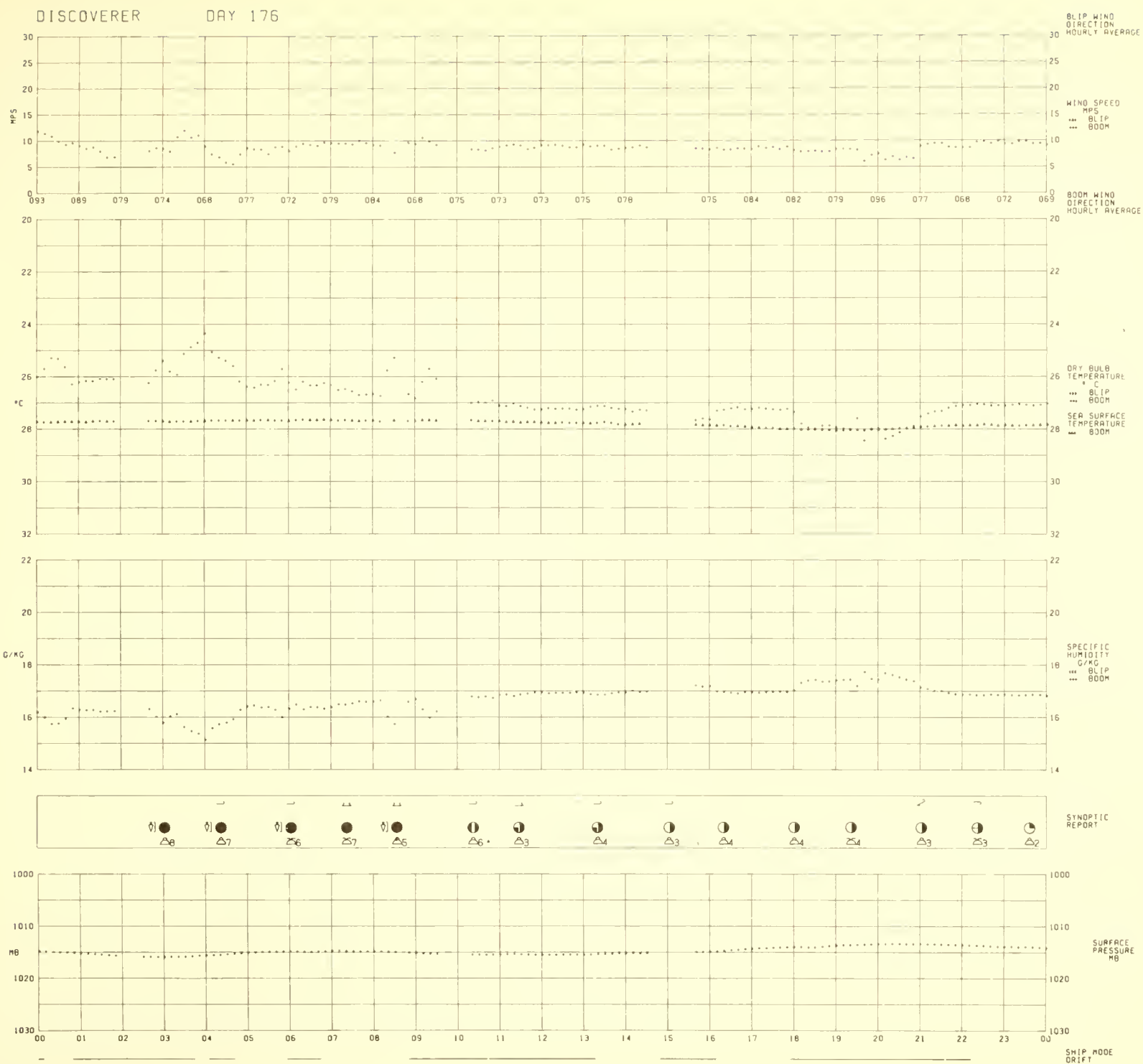
DISCOVERER DAY 174



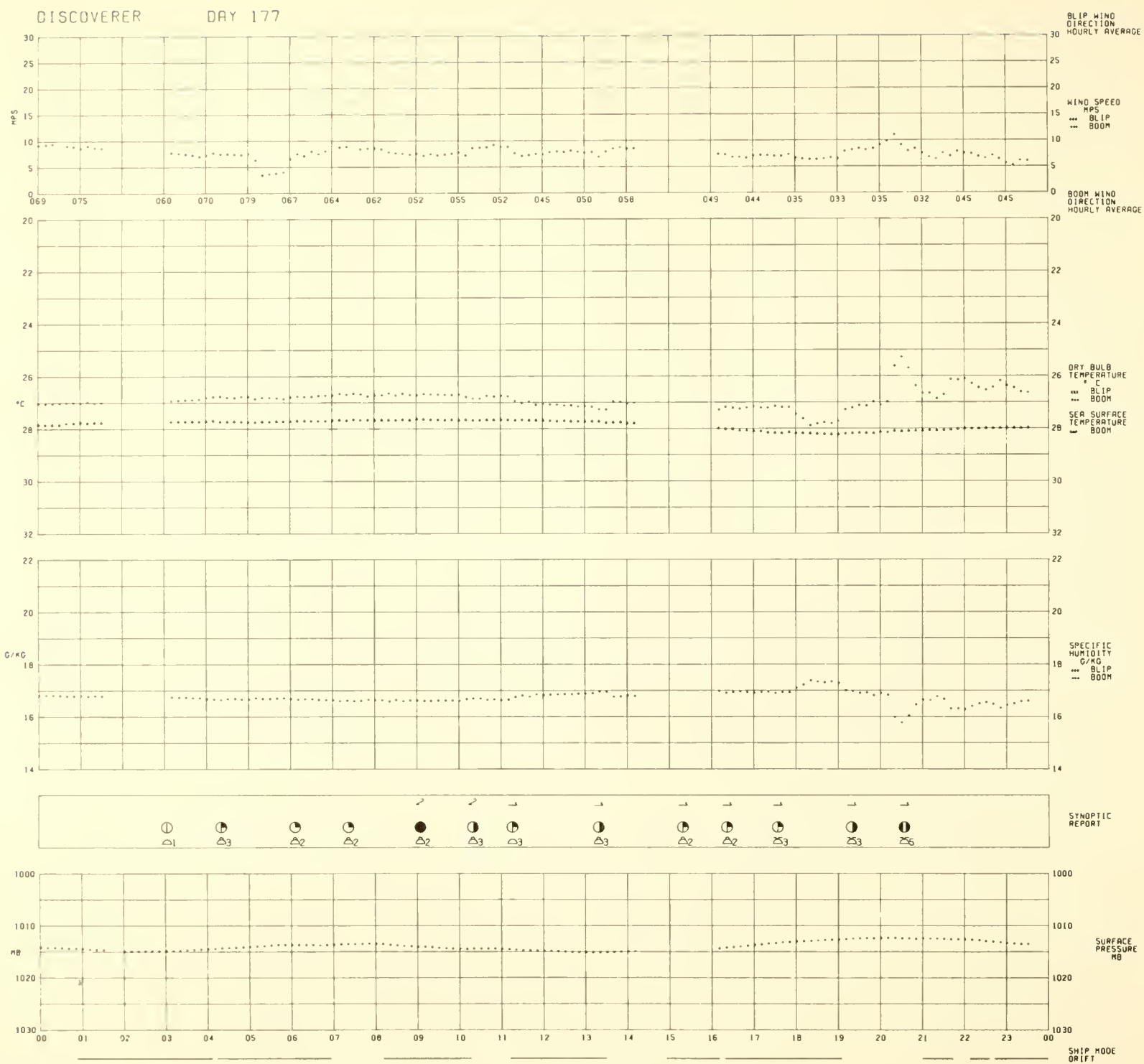
Discoverer, June 23, 1969



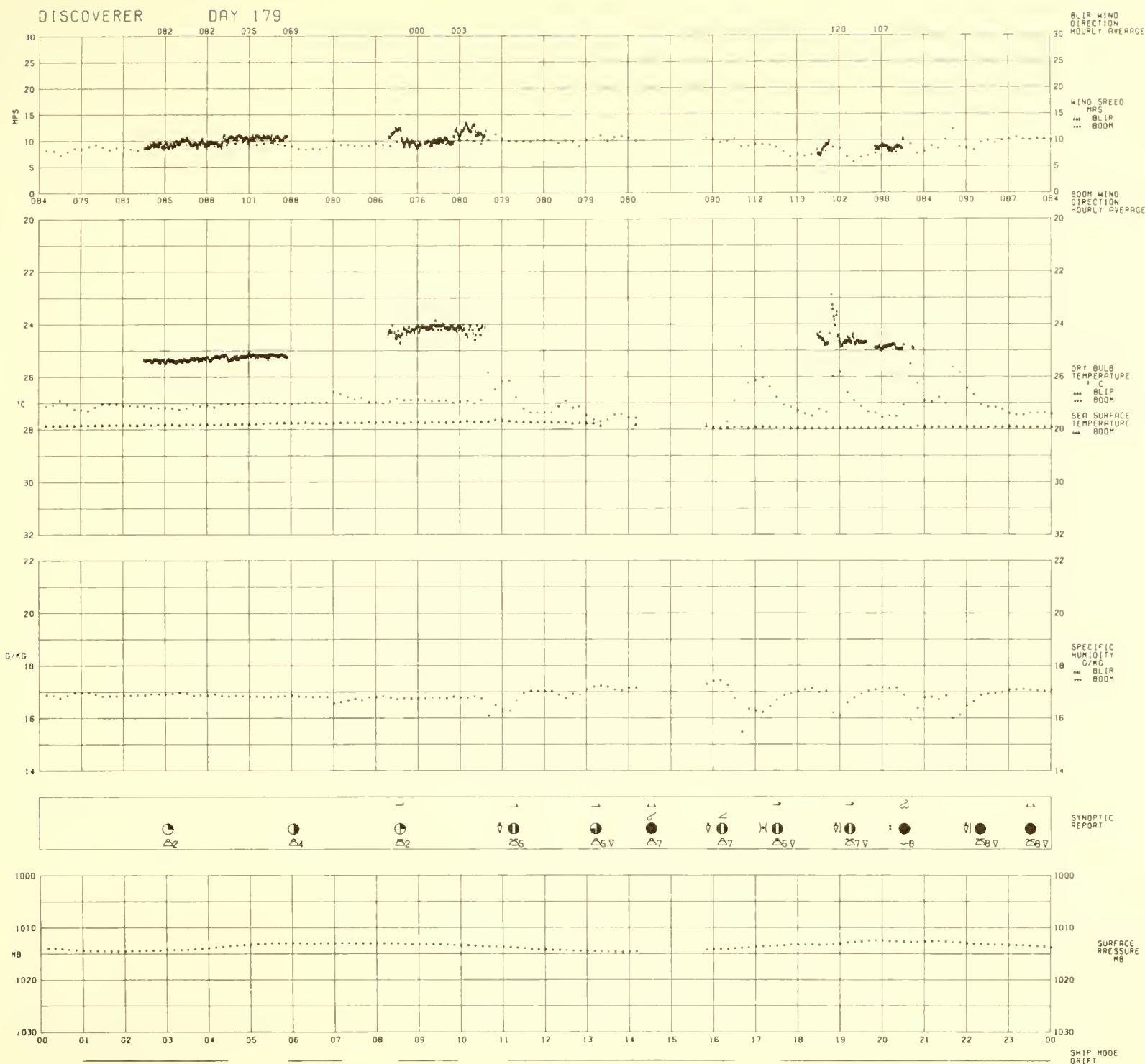
Discoverer, June 24, 1969



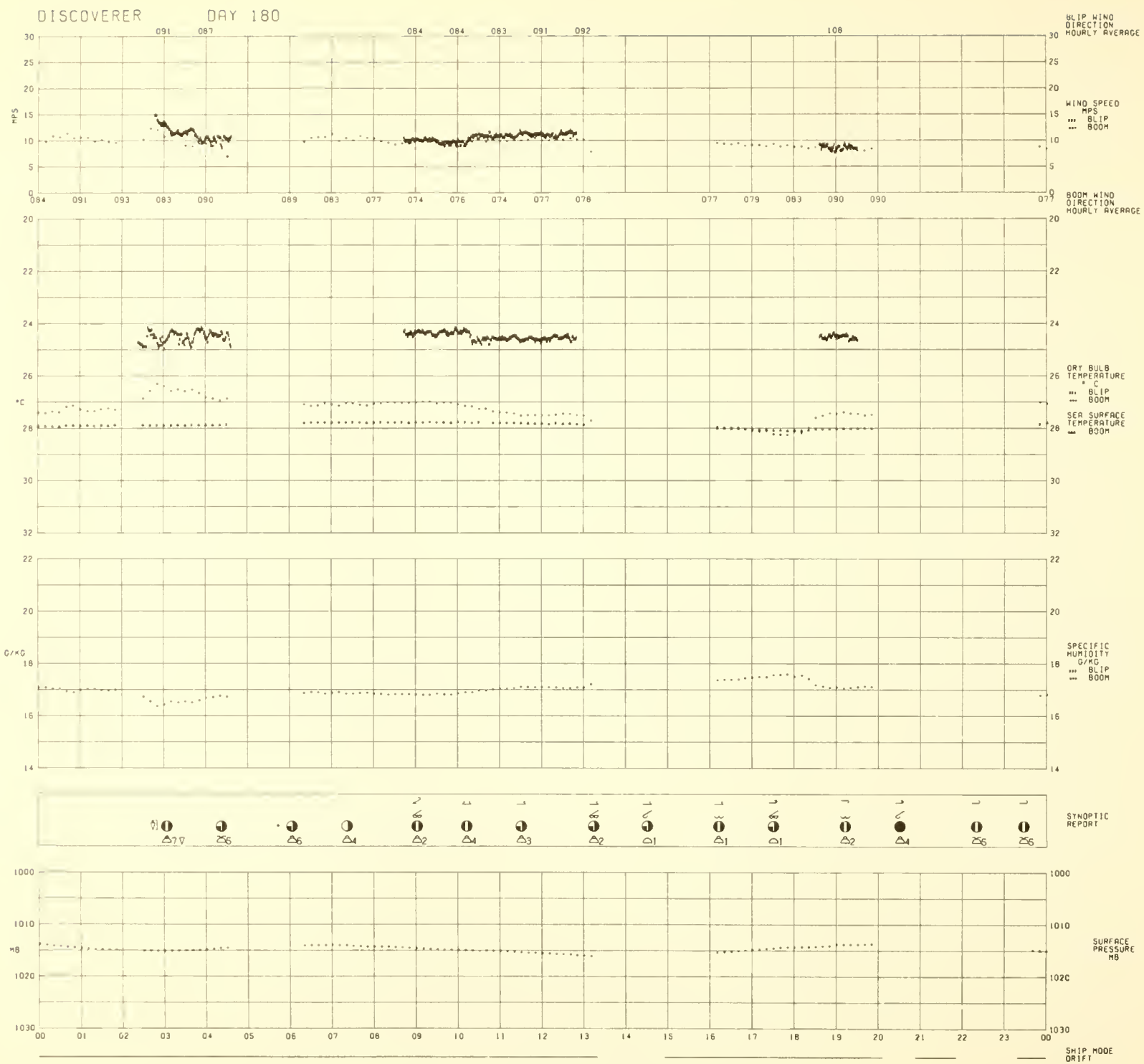
Discoverer, June 25, 1969



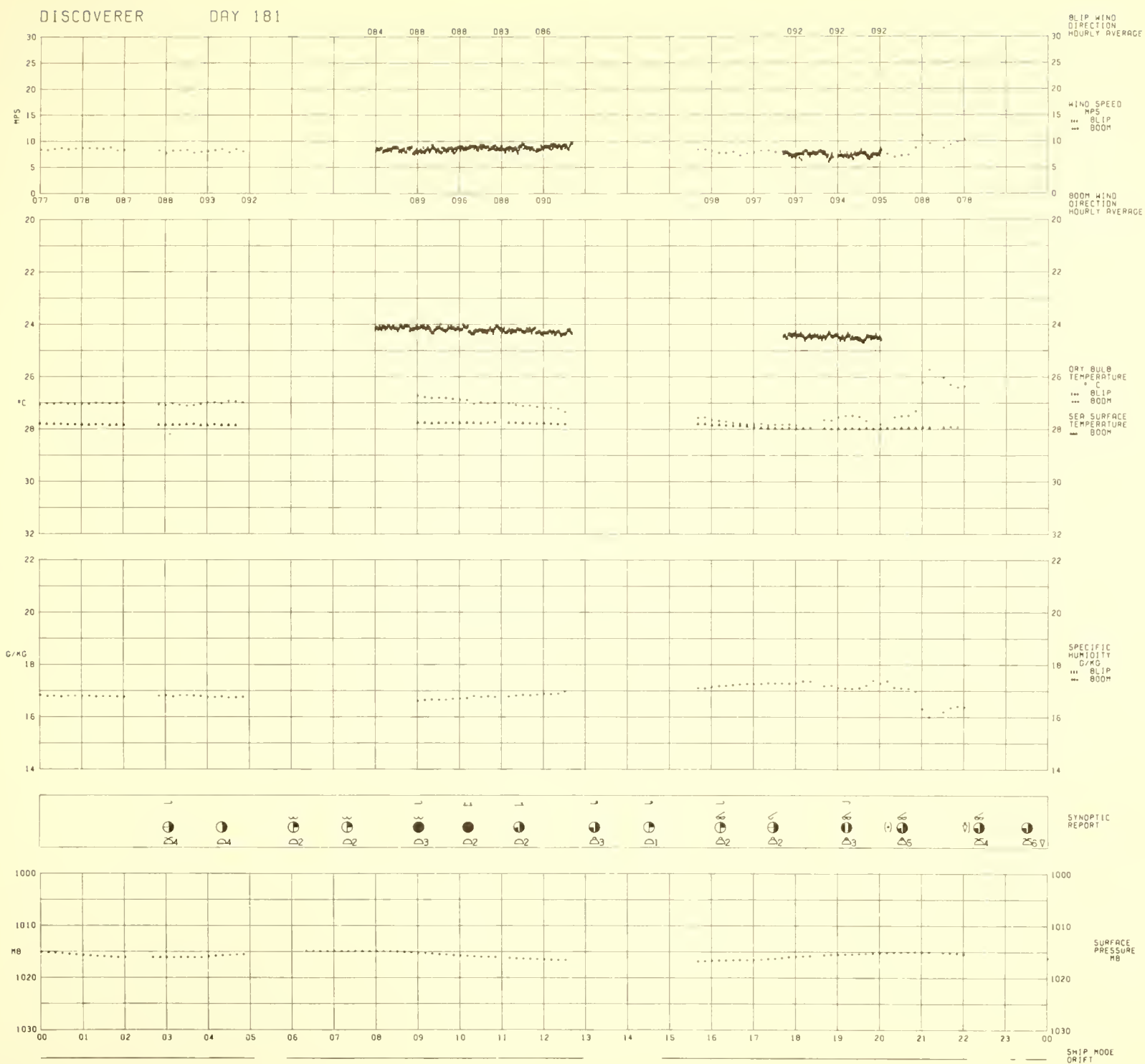
Discoverer, June 26, 1969



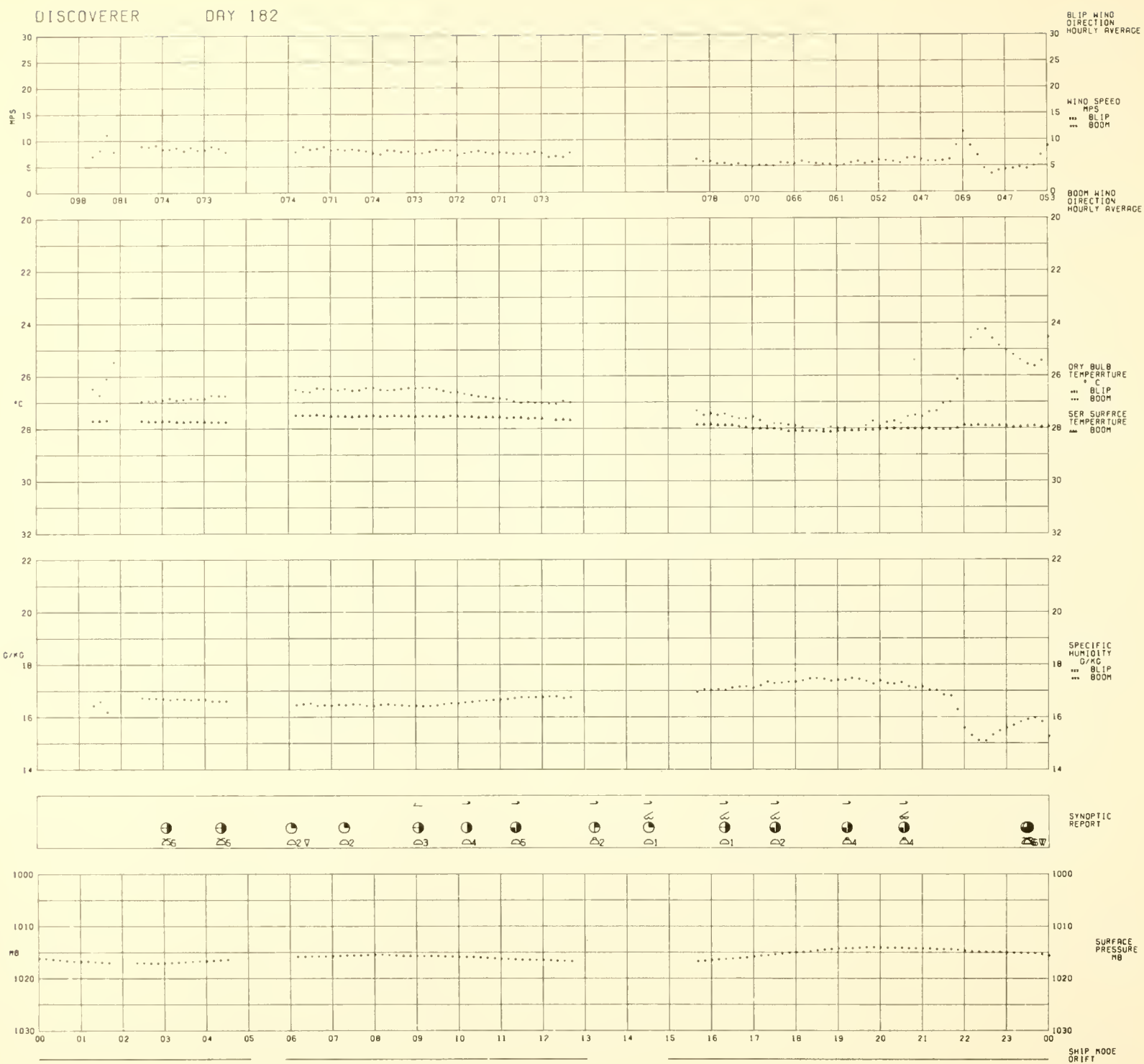
Discoverer, June 28, 1969



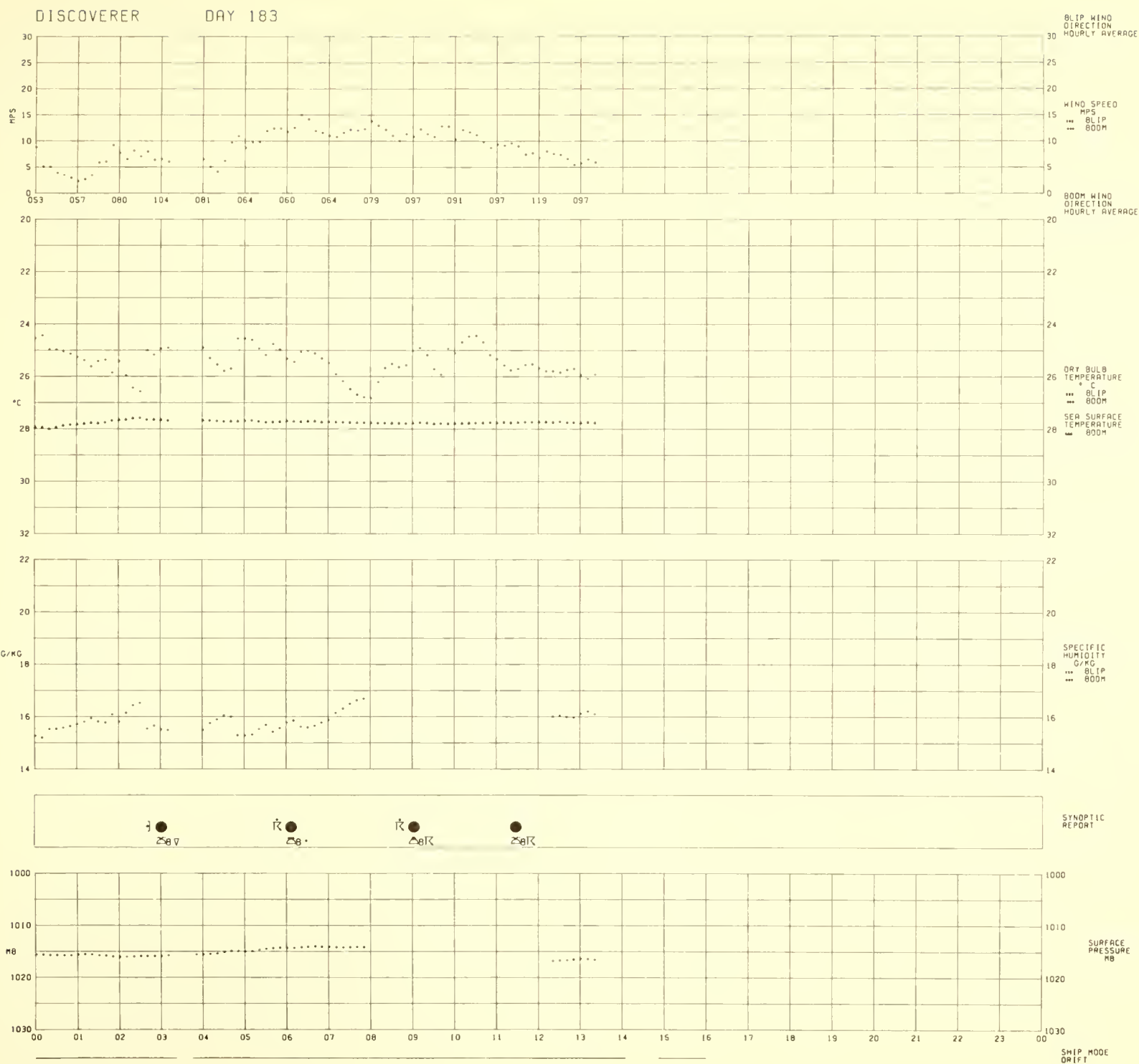
Discoverer, June 29, 1969



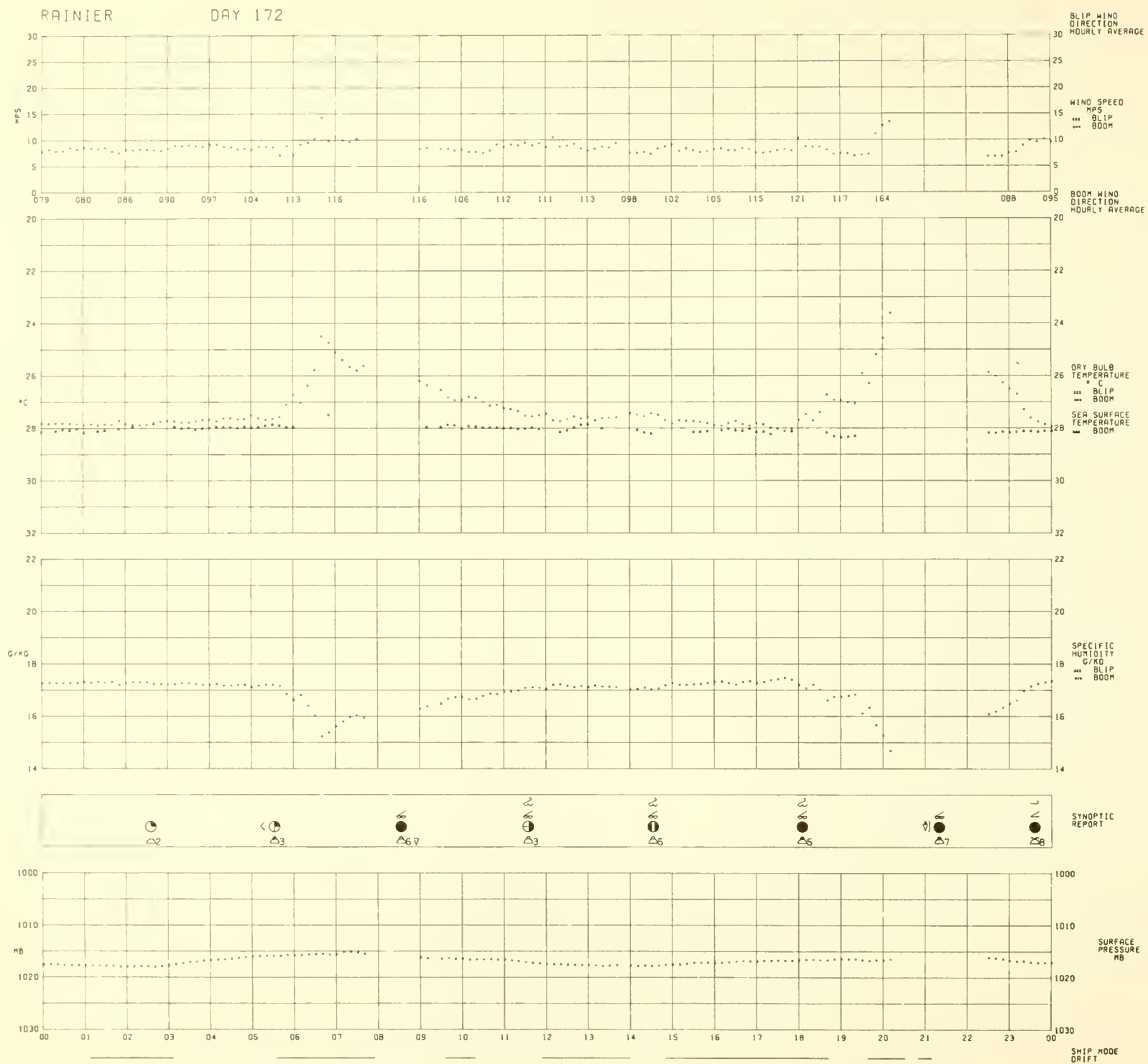
Discoverer, June 30, 1969



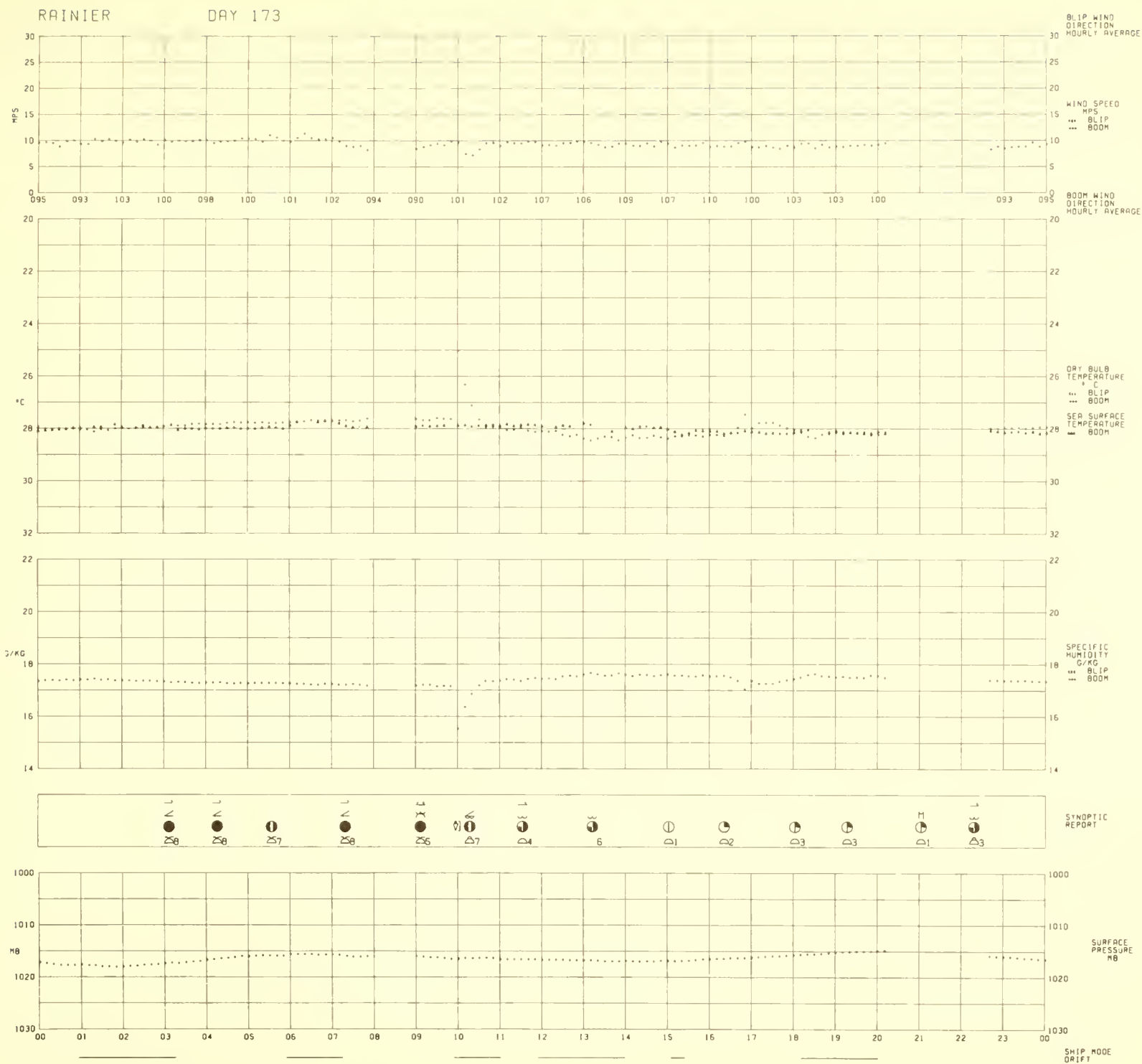
Discoverer, July 1, 1969



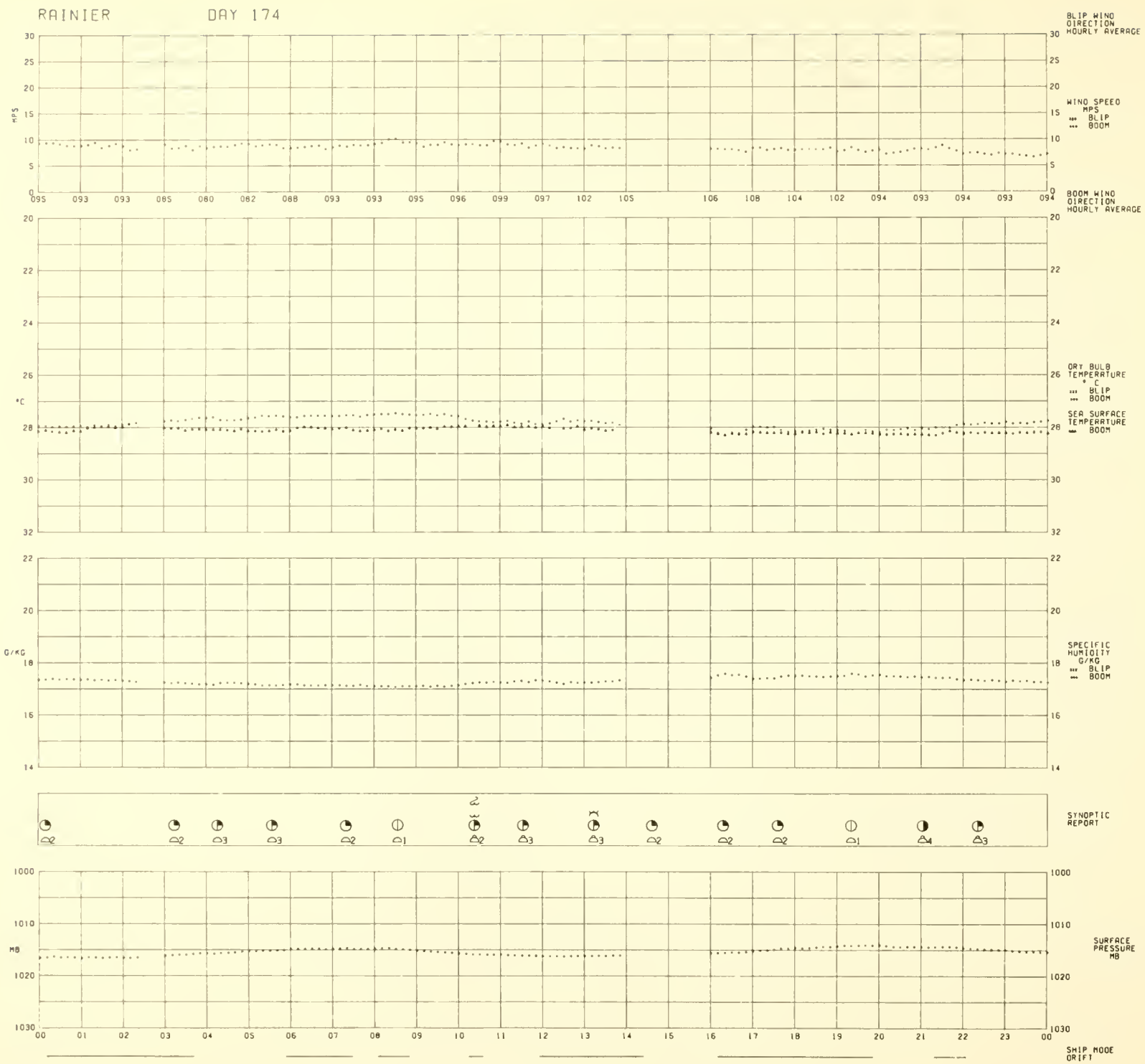
Discoverer, July 2, 1969



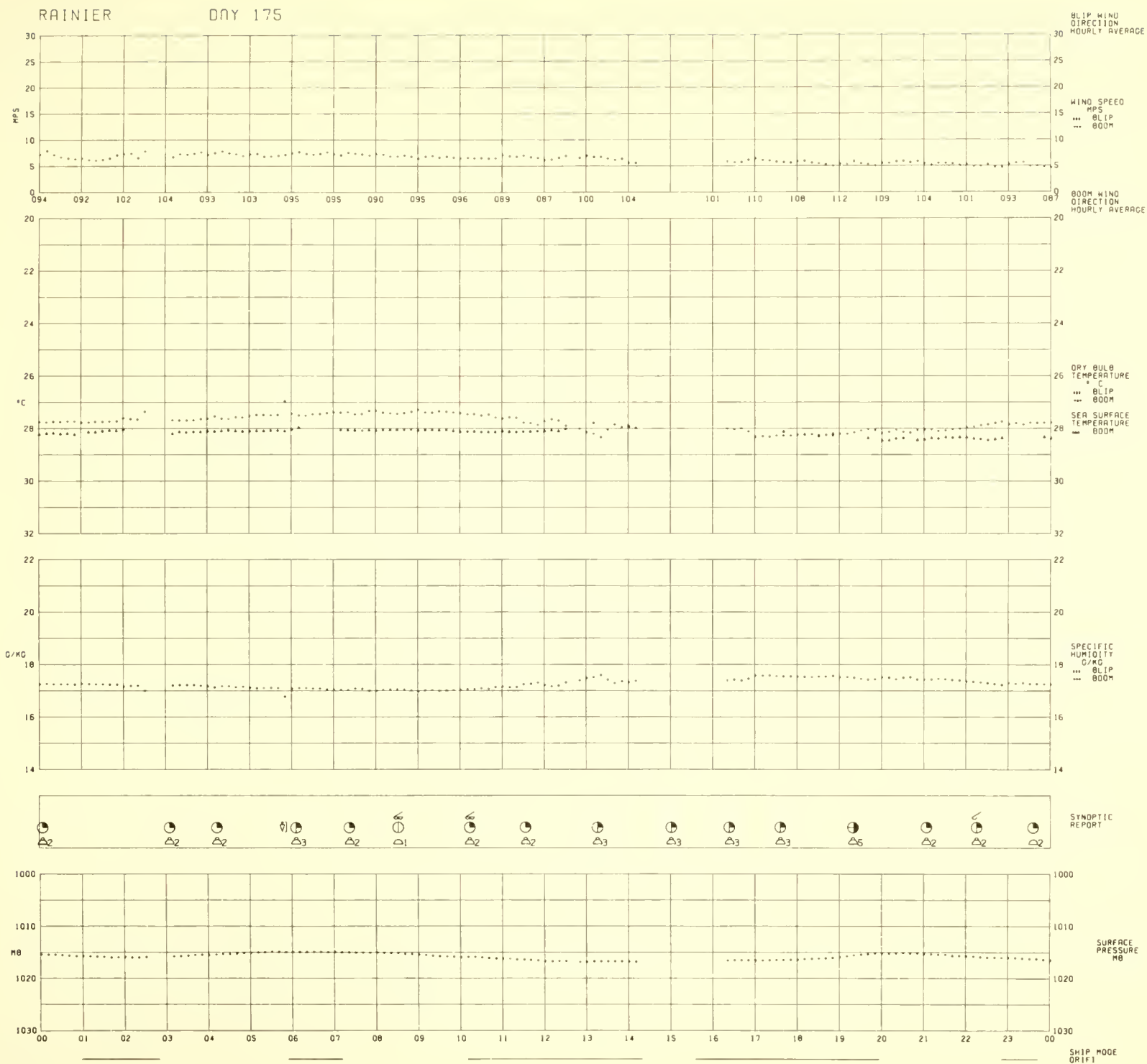
Rainier, June 21, 1969



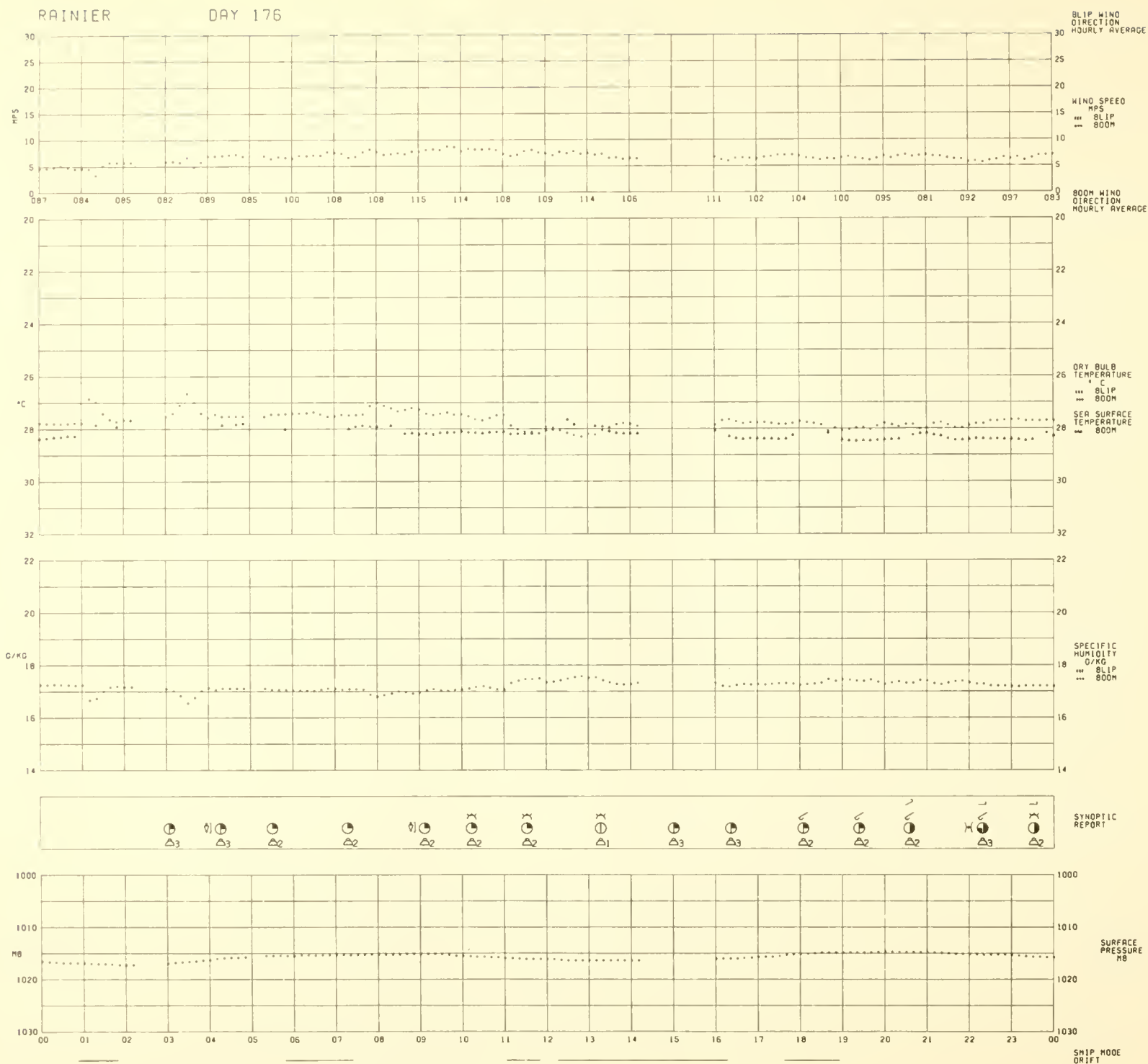
Rainier, June 22, 1969



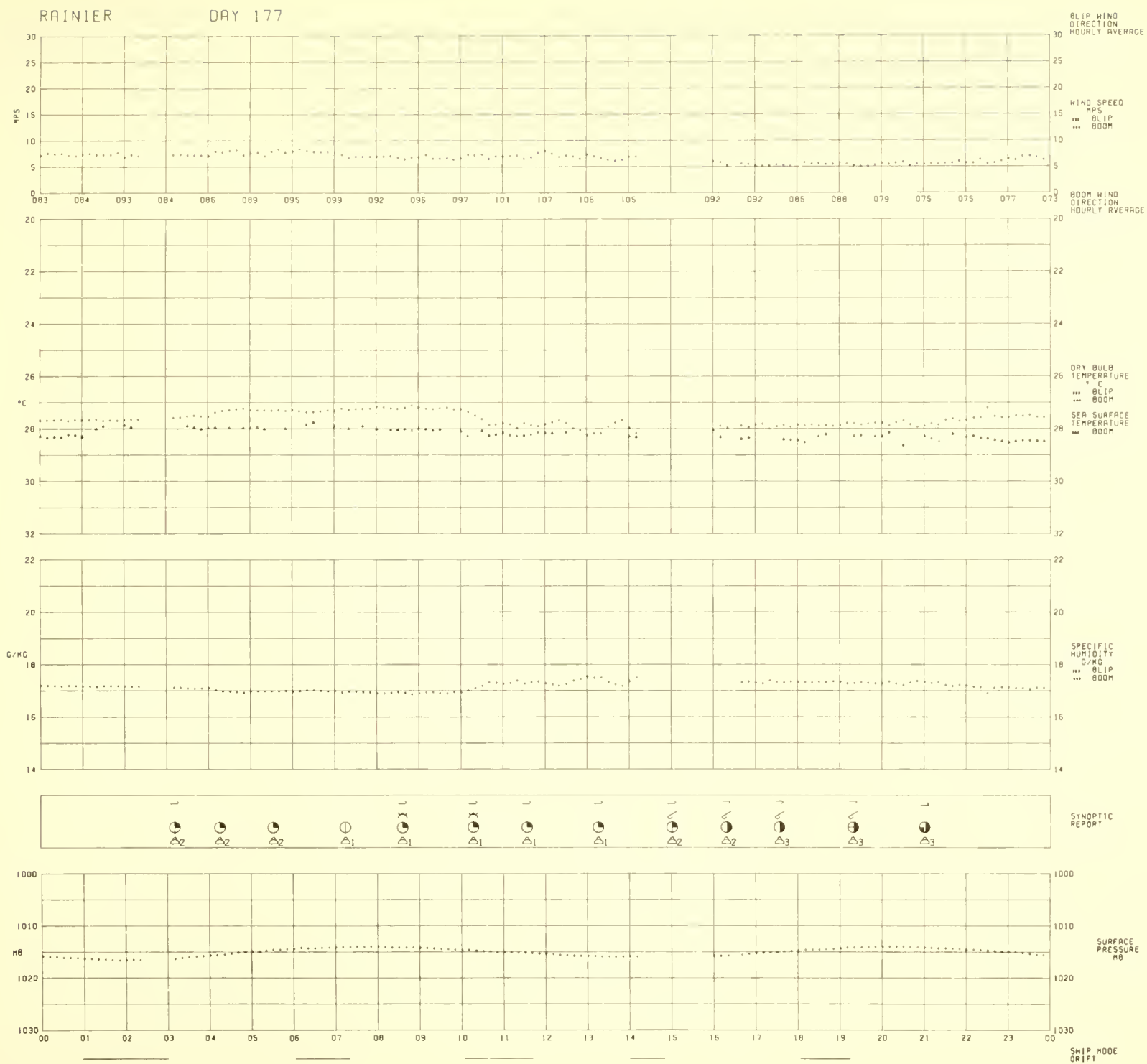
Rainier, June 23, 1969



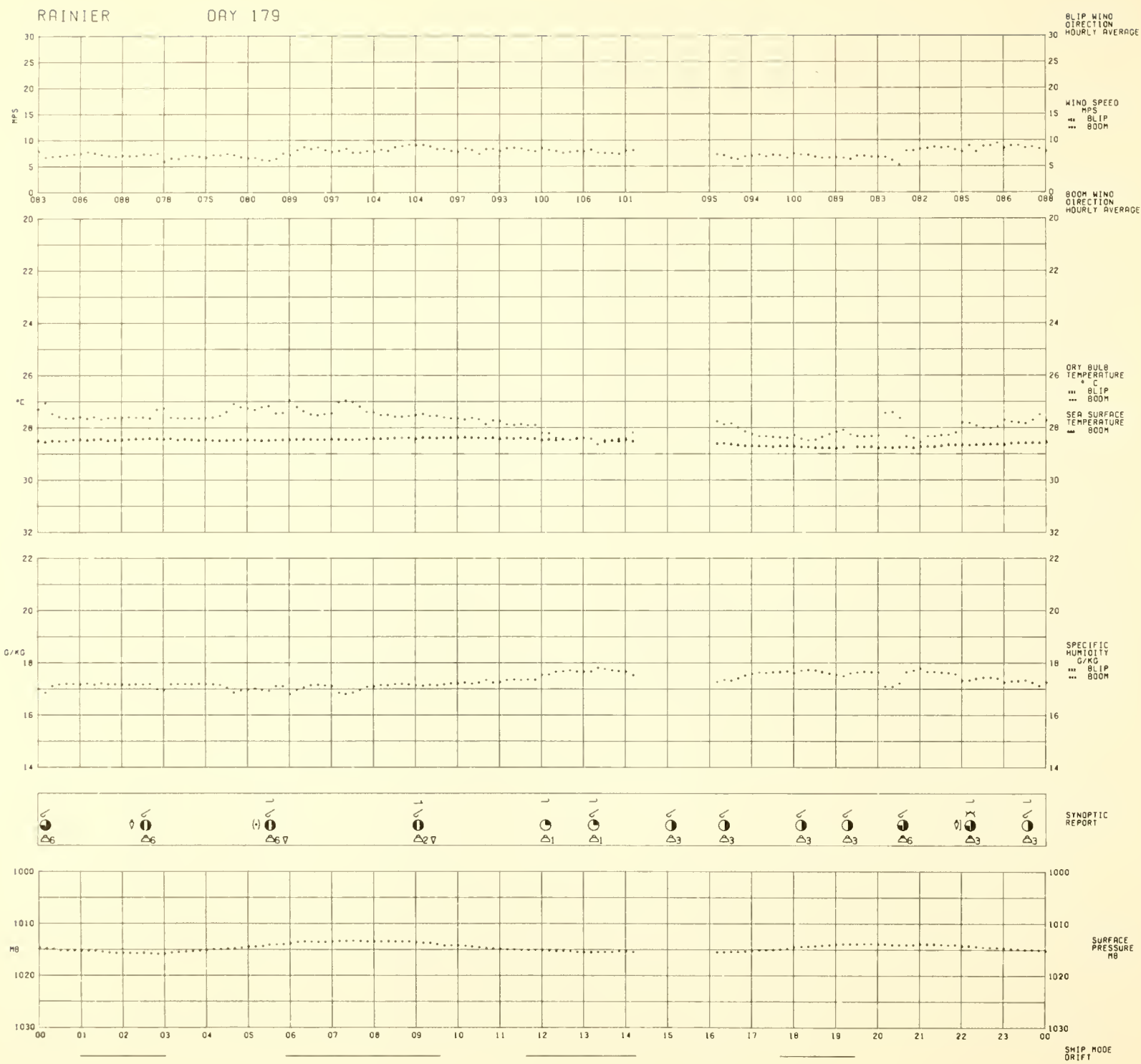
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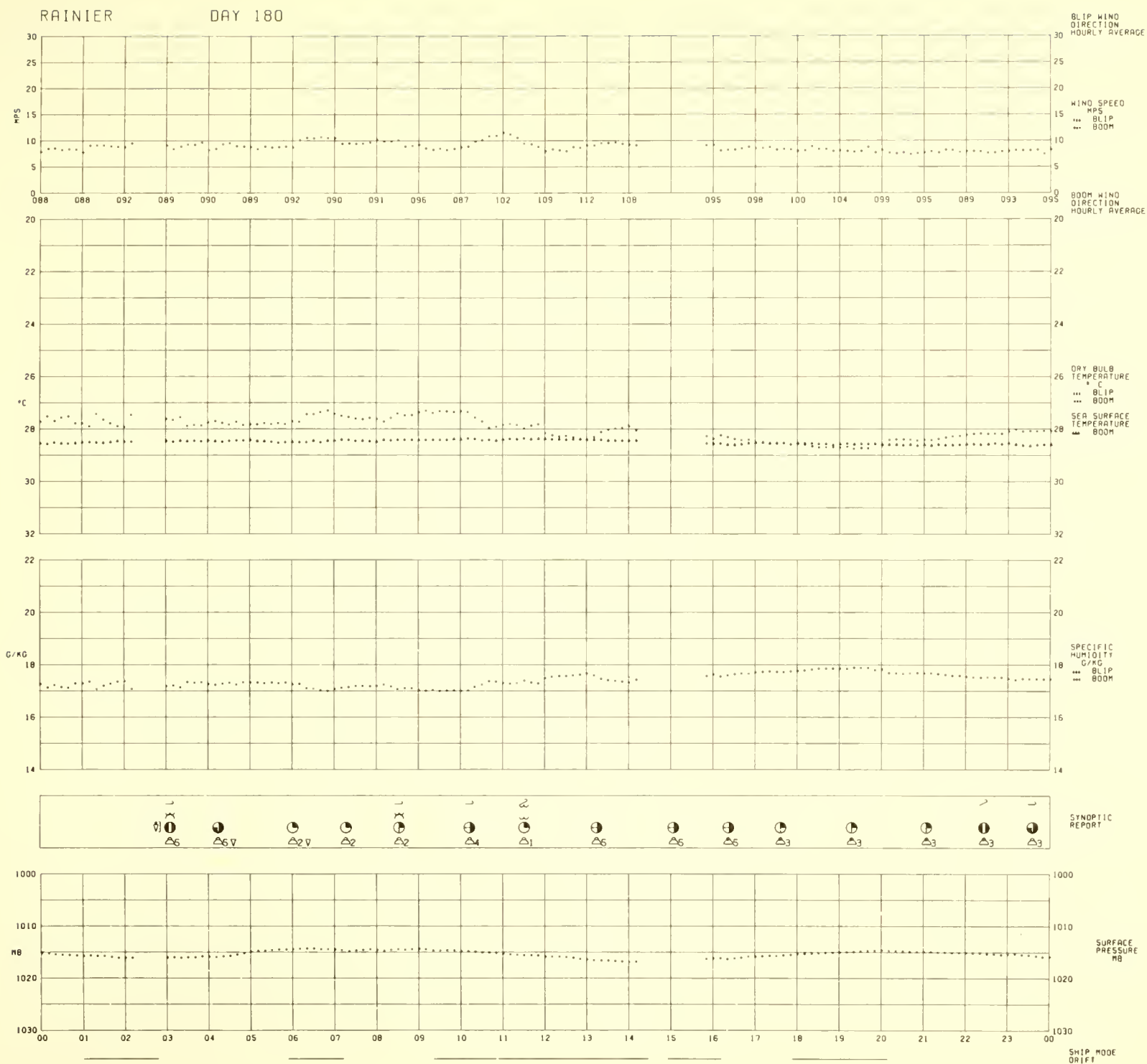
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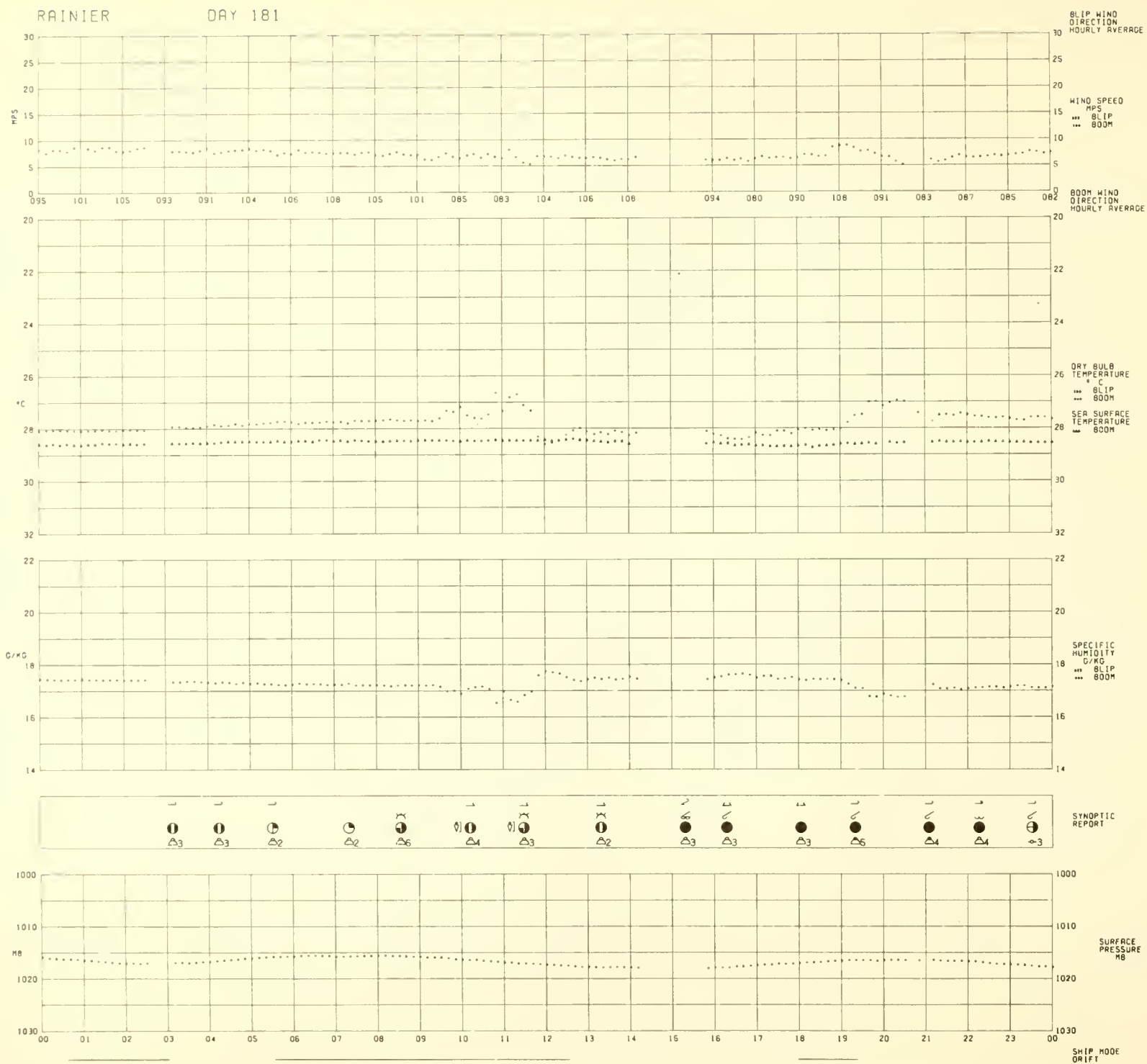
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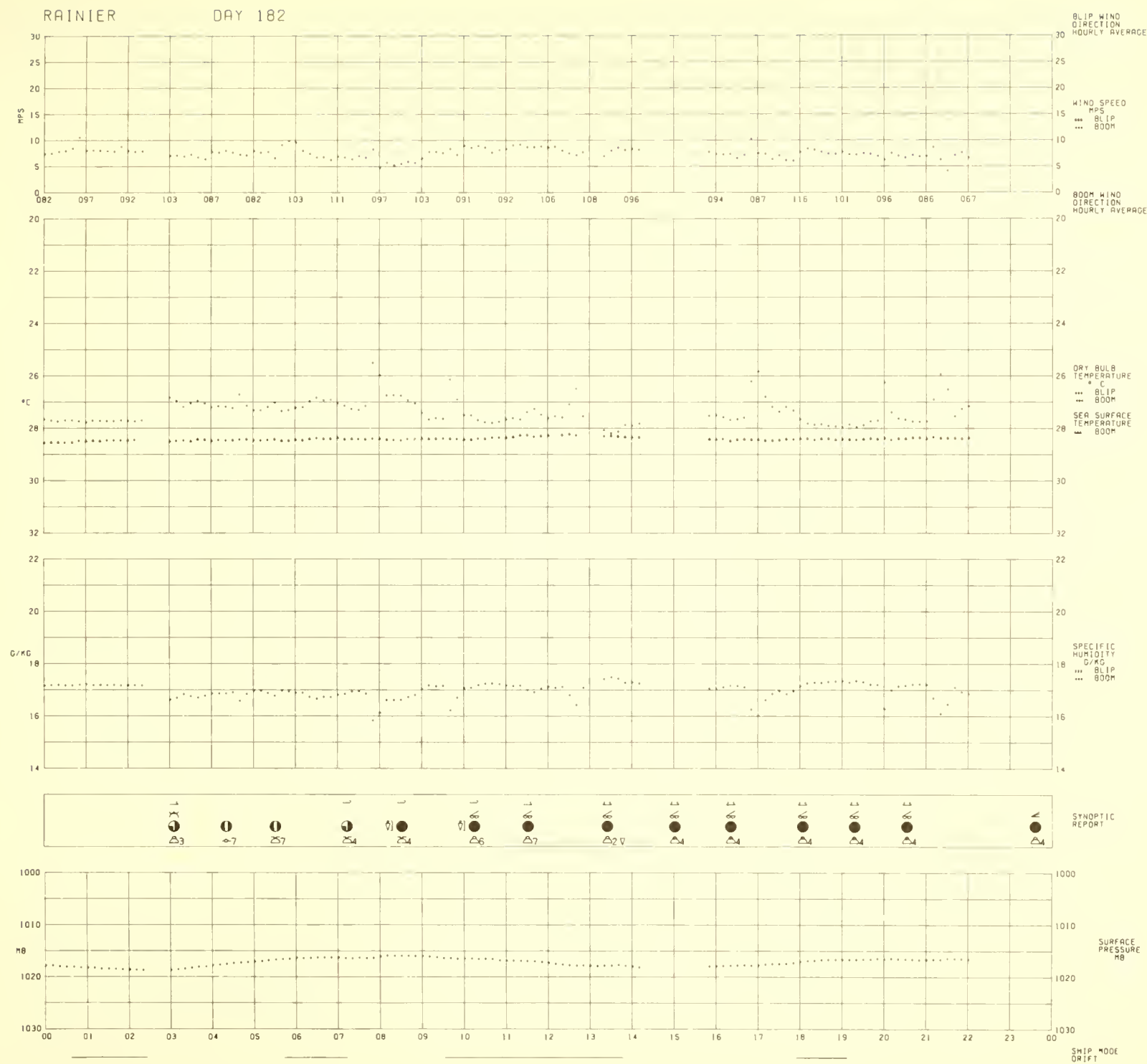
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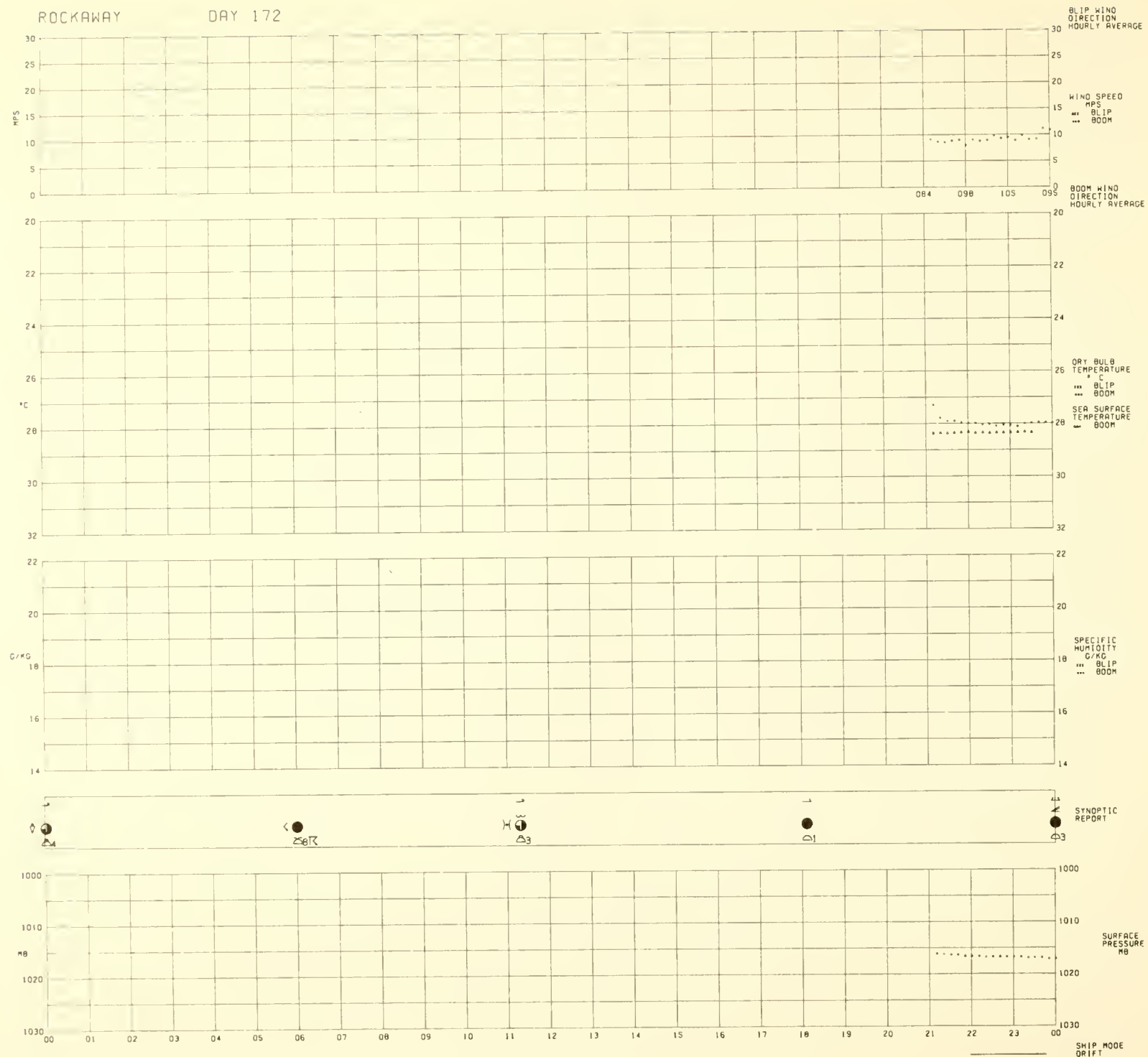
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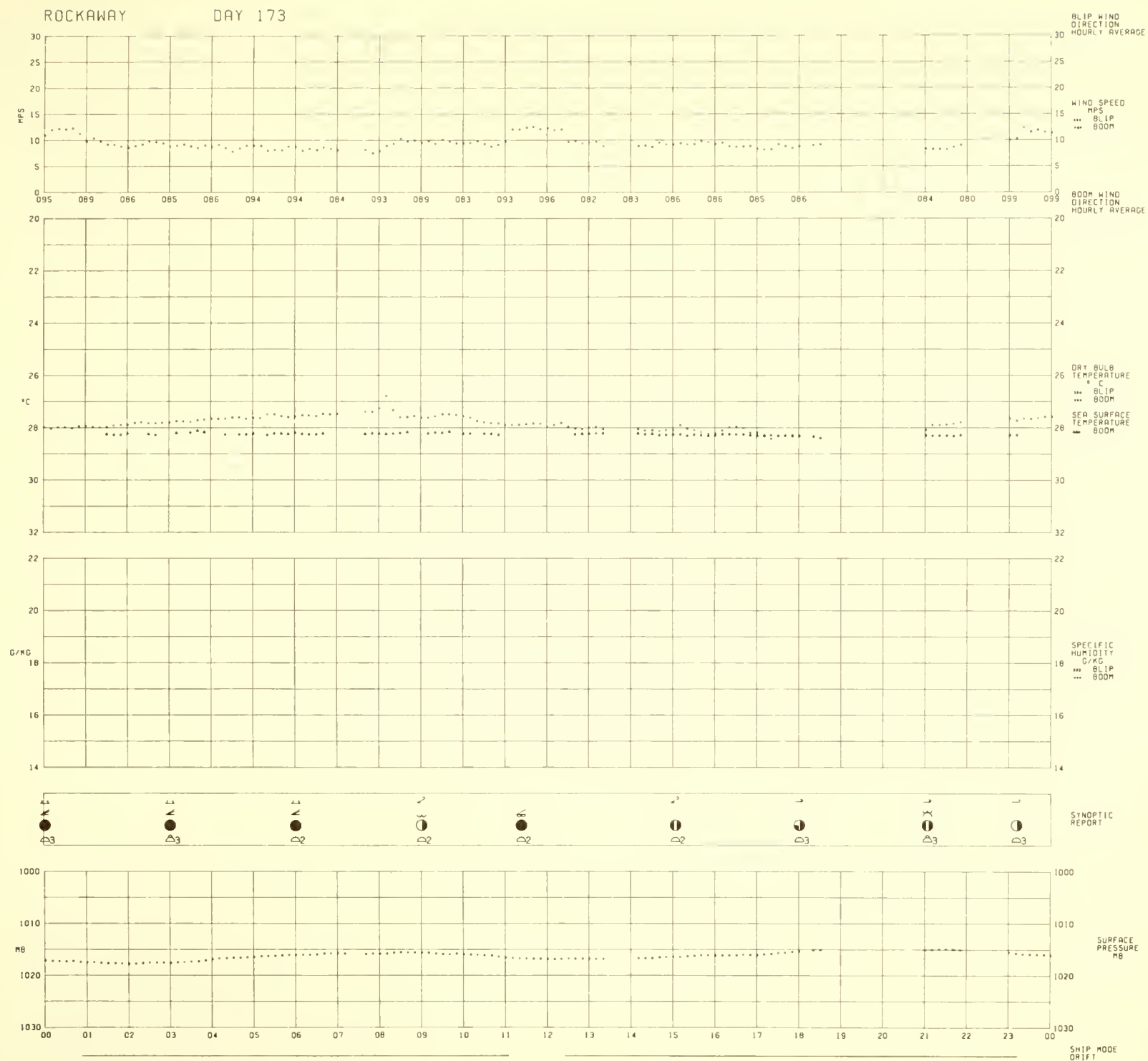
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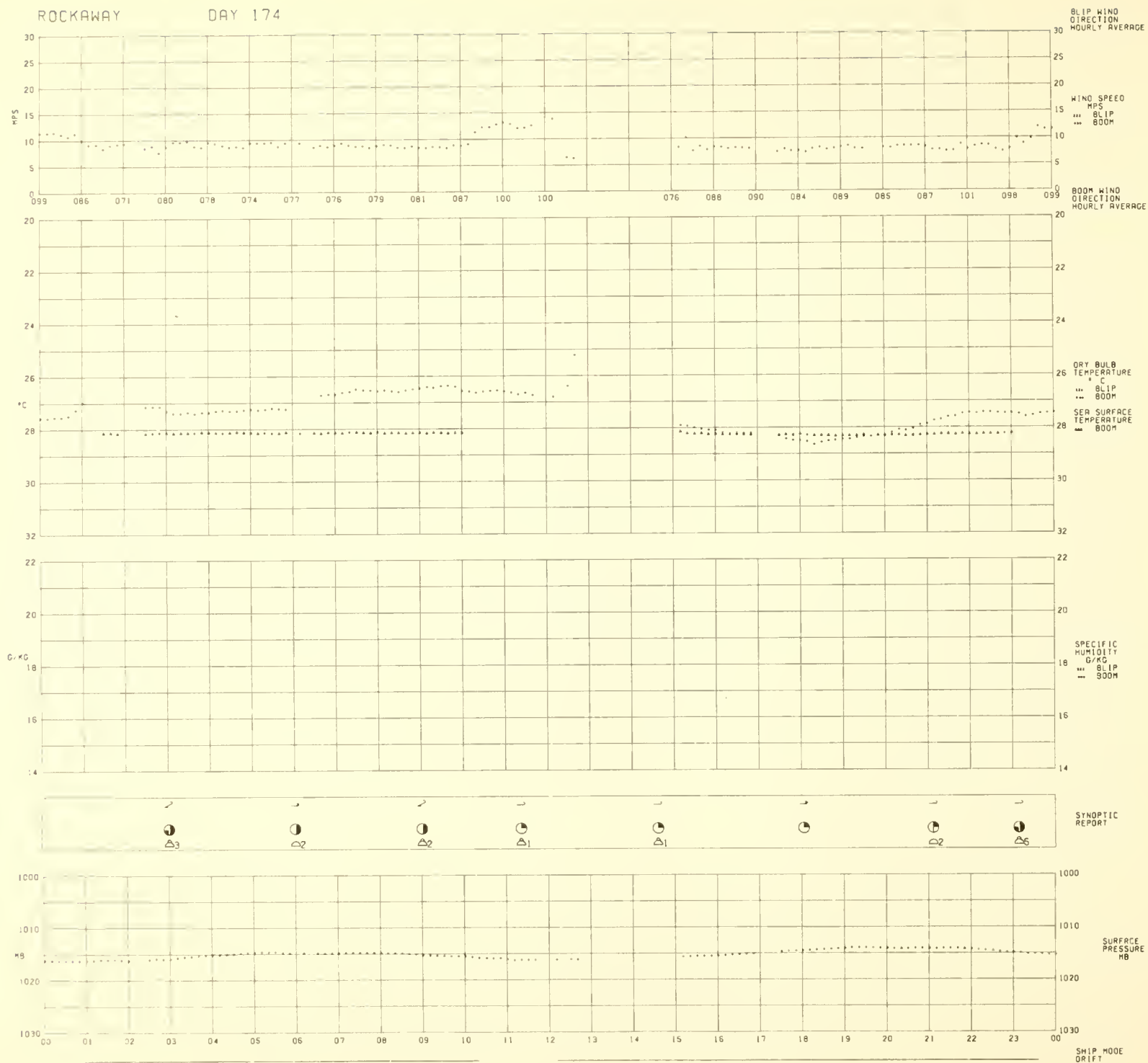
Rainier, July 1, 1969



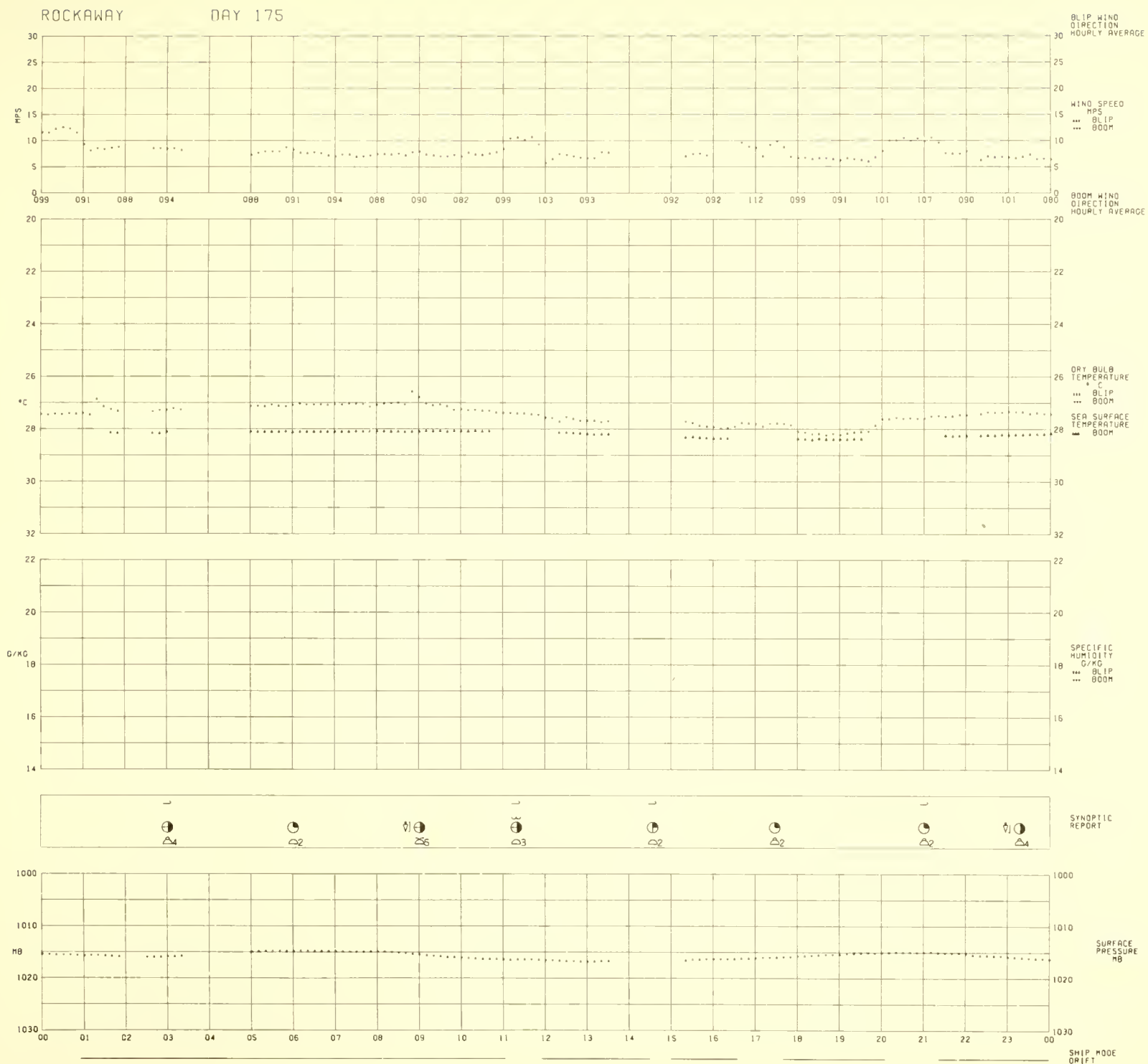
Rockaway, June 21, 1969



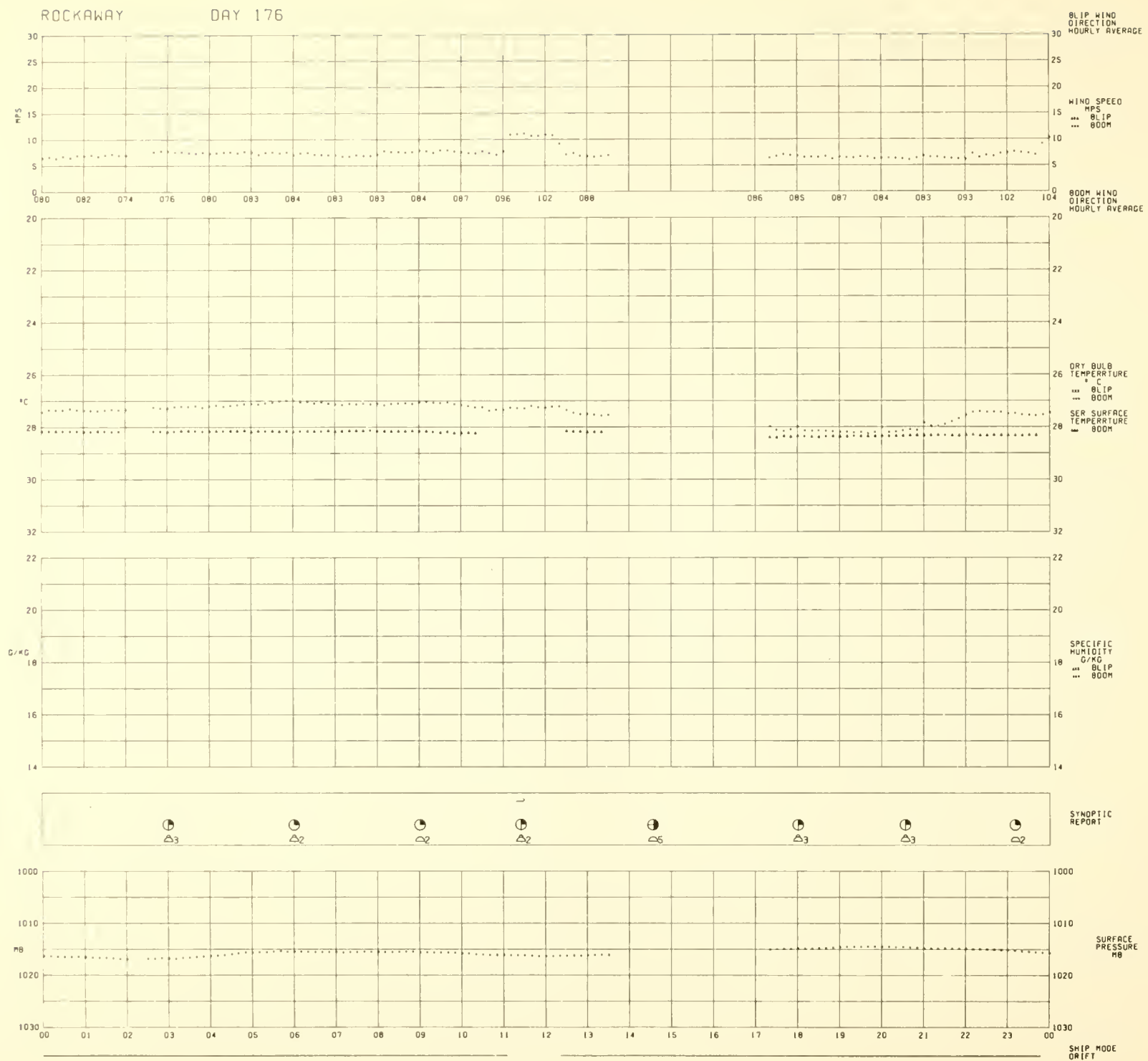
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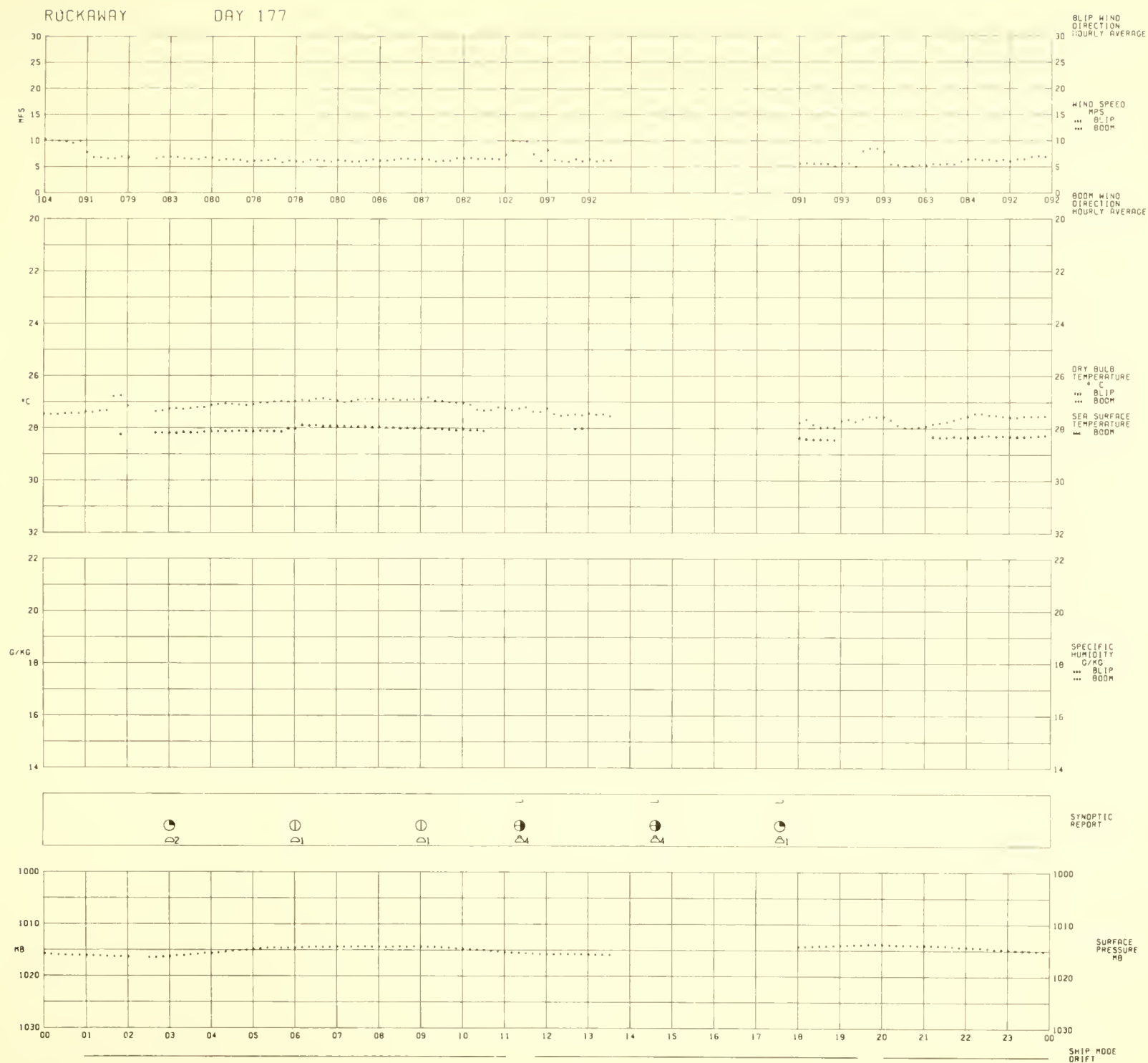
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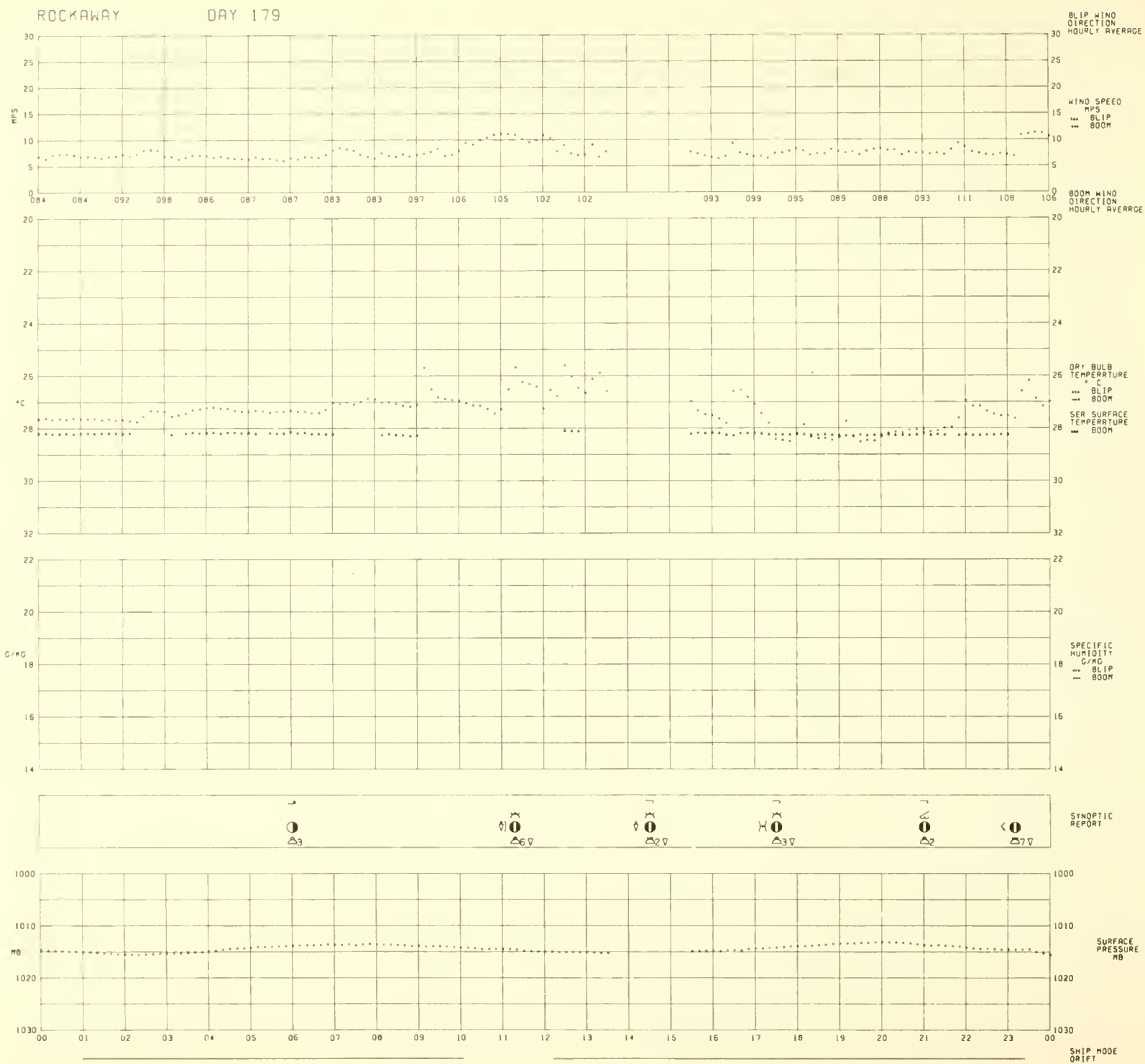
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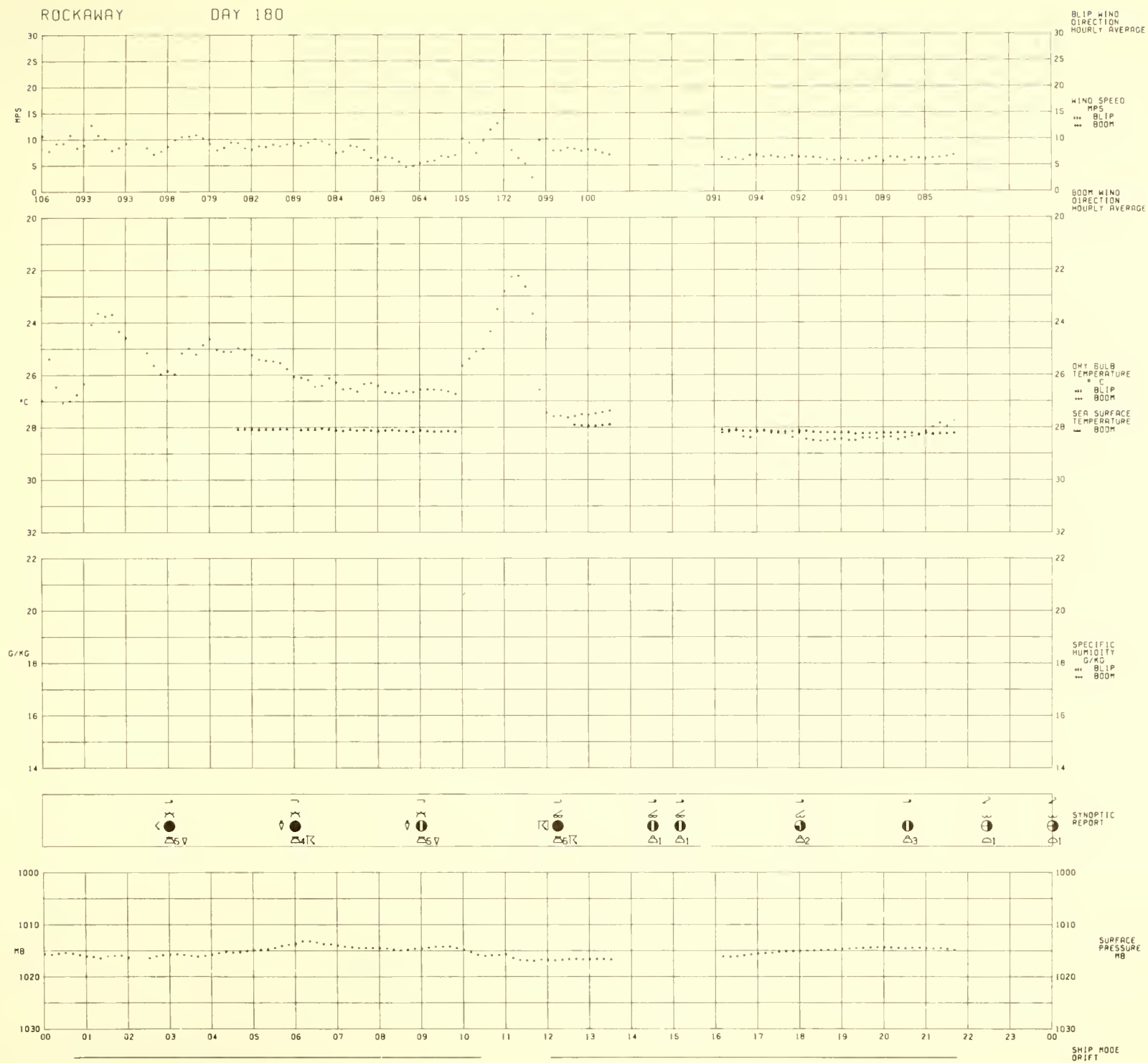
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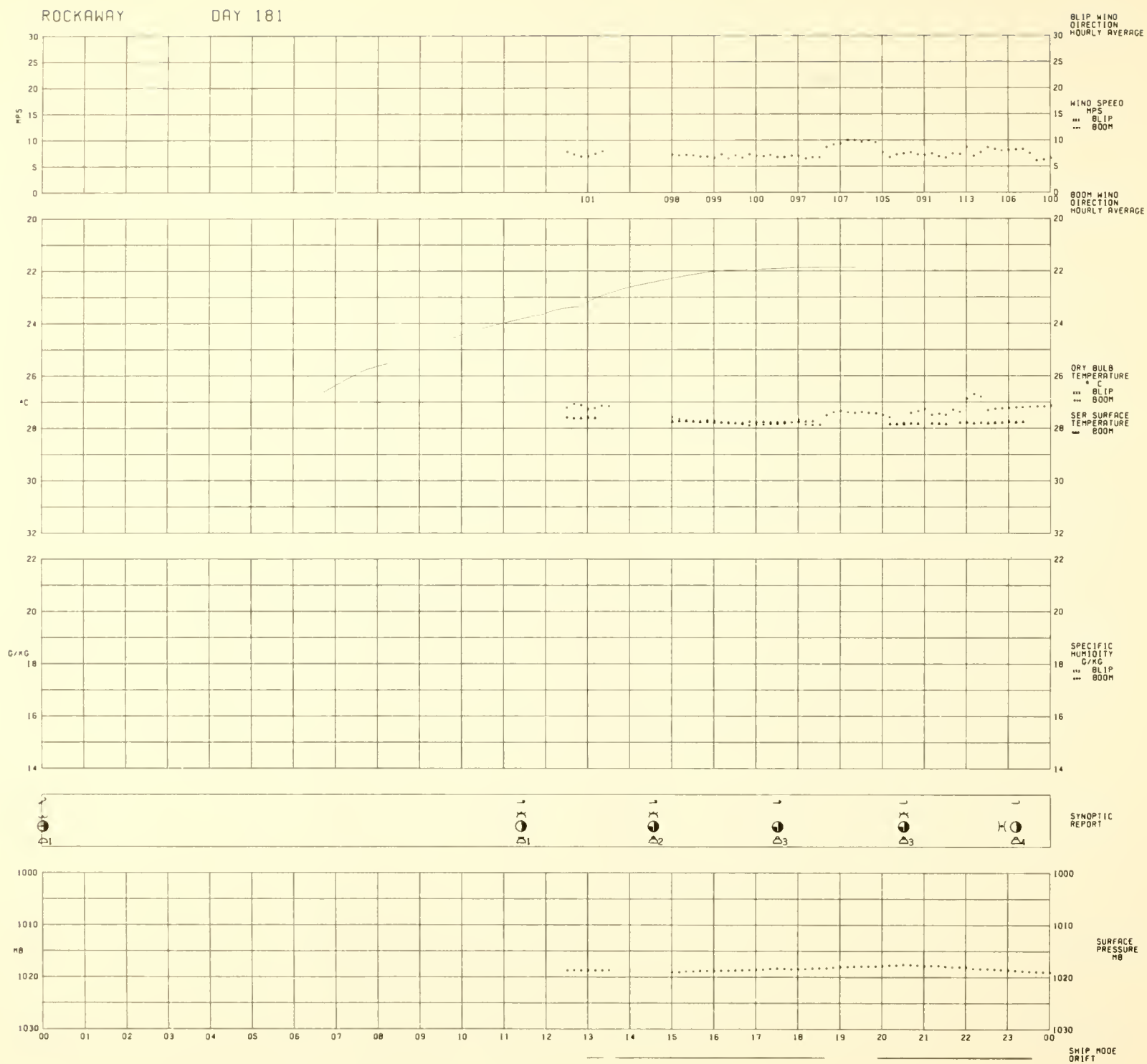
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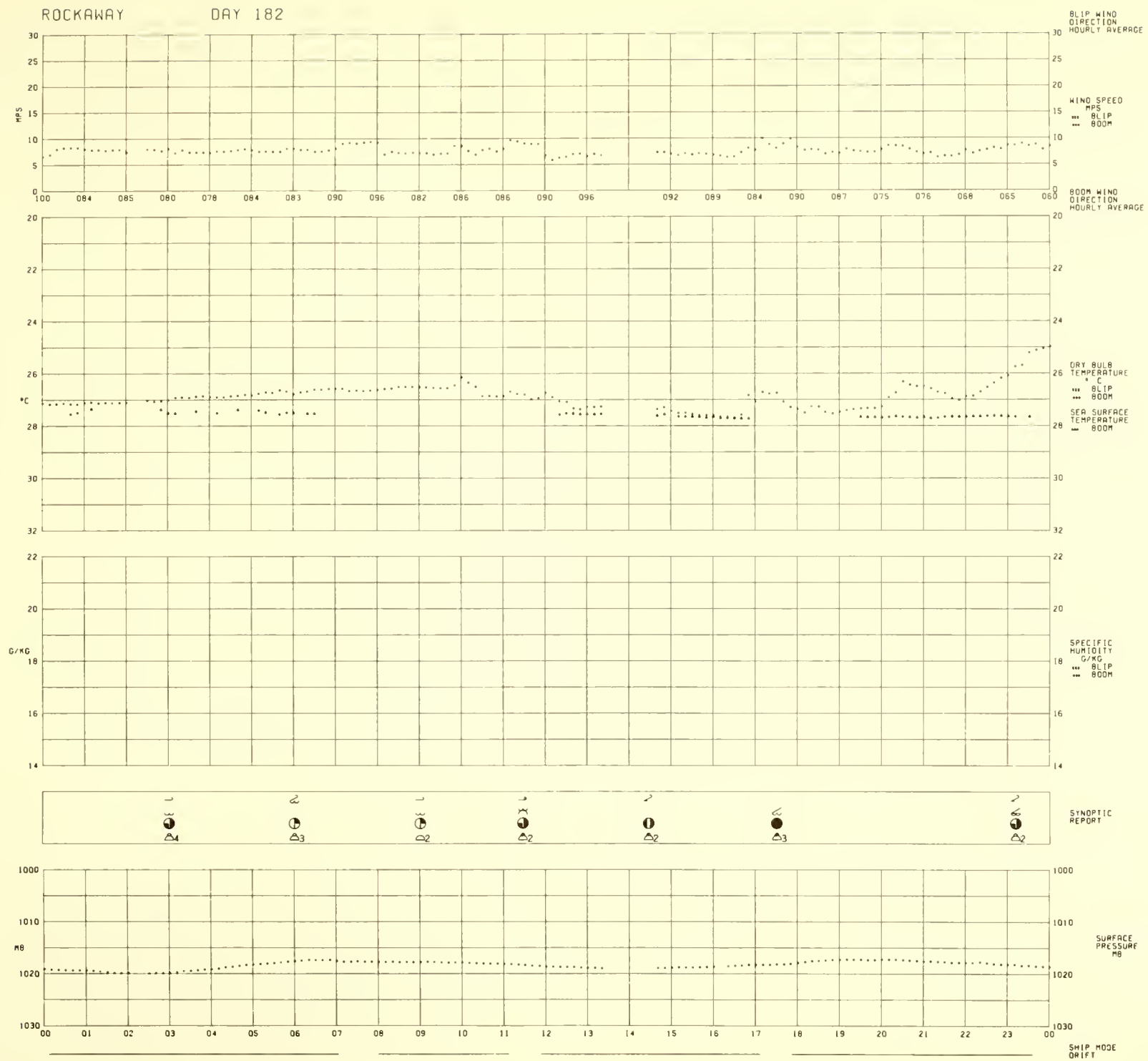
Rockaway, June 28, 1969



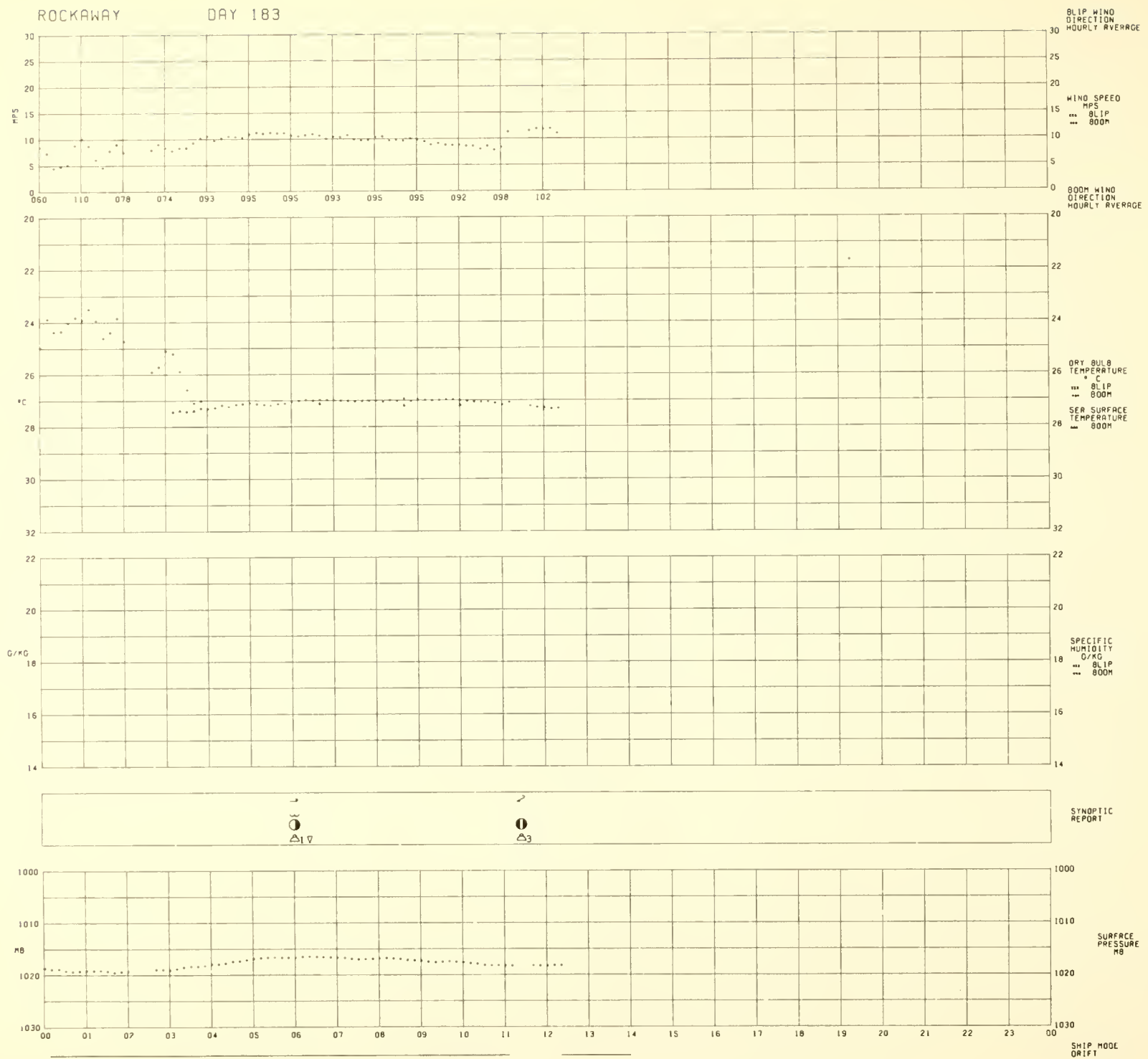
Rockaway, June 29, 1969



Rockaway, June 30, 1969



Rockaway, July 1, 1969



Rockaway, July 2, 1969

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